

**RESOURCE CONSERVATION AND  
RECOVERY ACT (RCRA)**

**PART B OF THE PERMIT APPLICATION**

**FOR**

**MARINE CORPS AIR STATION EL TORO  
EL TORO, CALIFORNIA**

**PREPARED BY:**

**JACOBS ENGINEERING GROUP INC.  
251 SOUTH LAKE AVENUE  
PASADENA, CA 91101**

**10 JUNE 1992**

**REVISED: 29 JUNE 1992**



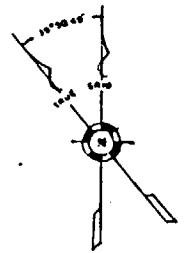
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26	27	28	29	

SHEET 1777

SCALE: 1"=500'  
 NOTE: THE LAST TWO DIGITS OF THE GRID COORDINATE  
 ARE THE GRID COORDINATE IN FEET.

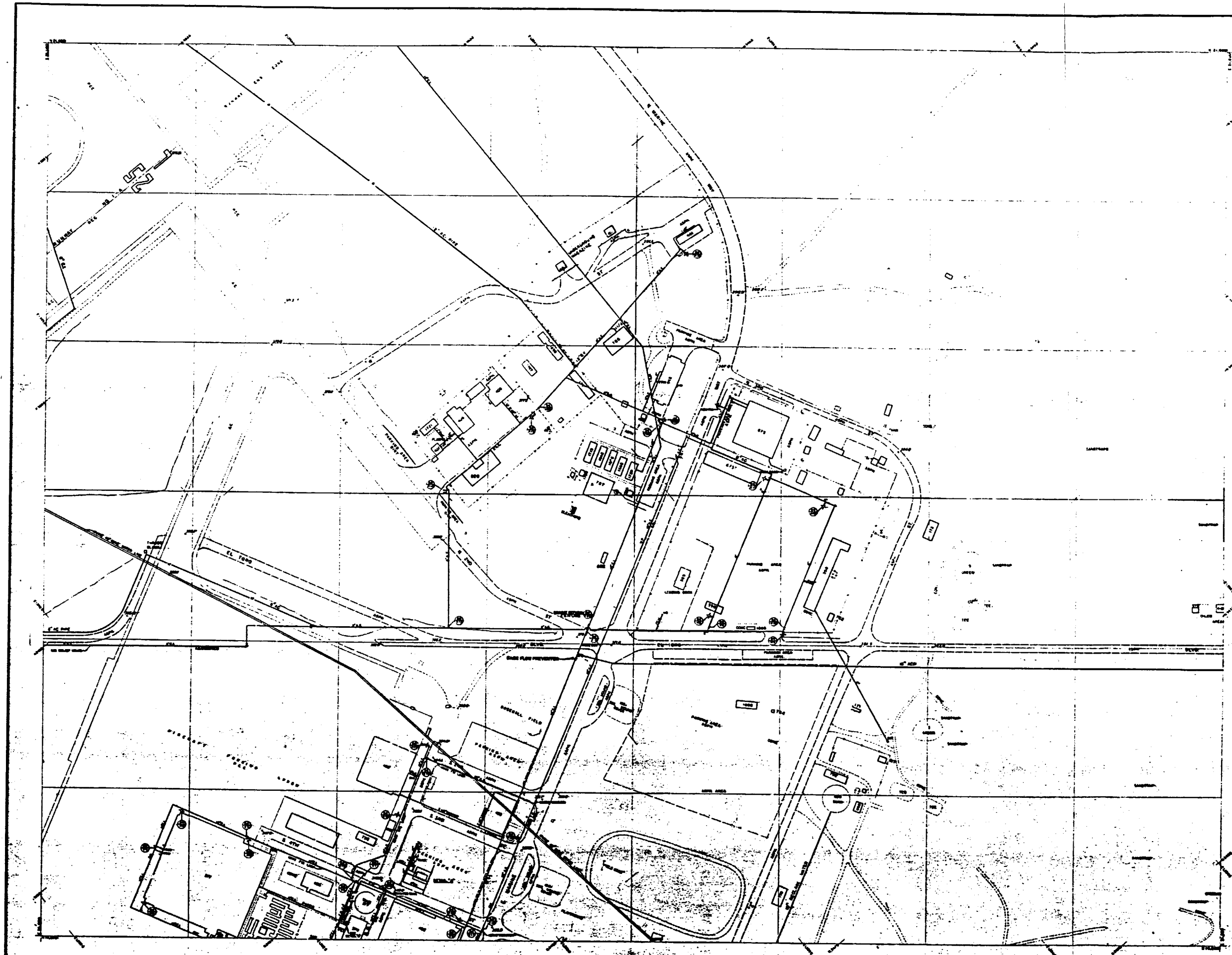
AREA 15  
 STORM SEWERS

U.S. MARINE CORPS AIR STATION	
PUBLIC WORKS DEPARTMENT	
DATE: 10/1/54	BY: [Signature]
CHECKED BY: [Signature]	APPROVED BY: [Signature]



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SHEET INDEX

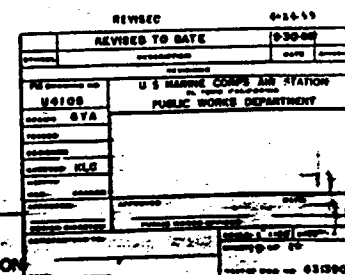
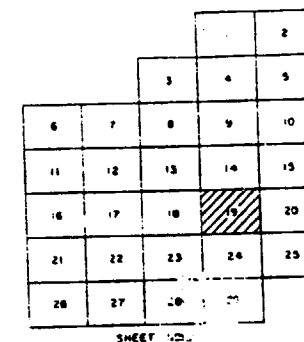


MADEIRA LEWIS ASSOCIATES ENGINEERS INC.  
CONSULTING ENGINEERS  
SANTA ANA, CALIF. 92705  
MAP REVISED AS OF 6-16-80

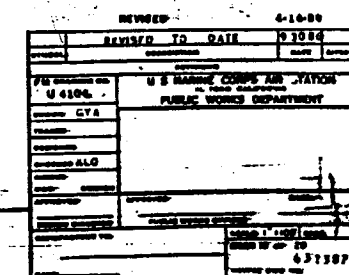
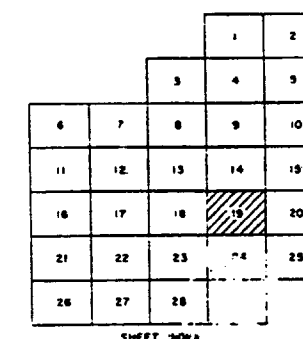
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NOTE THE LAST TWO DIGITS OF THE CALIF STATE PLANE COORDINATE  
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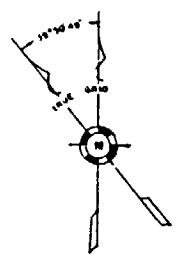
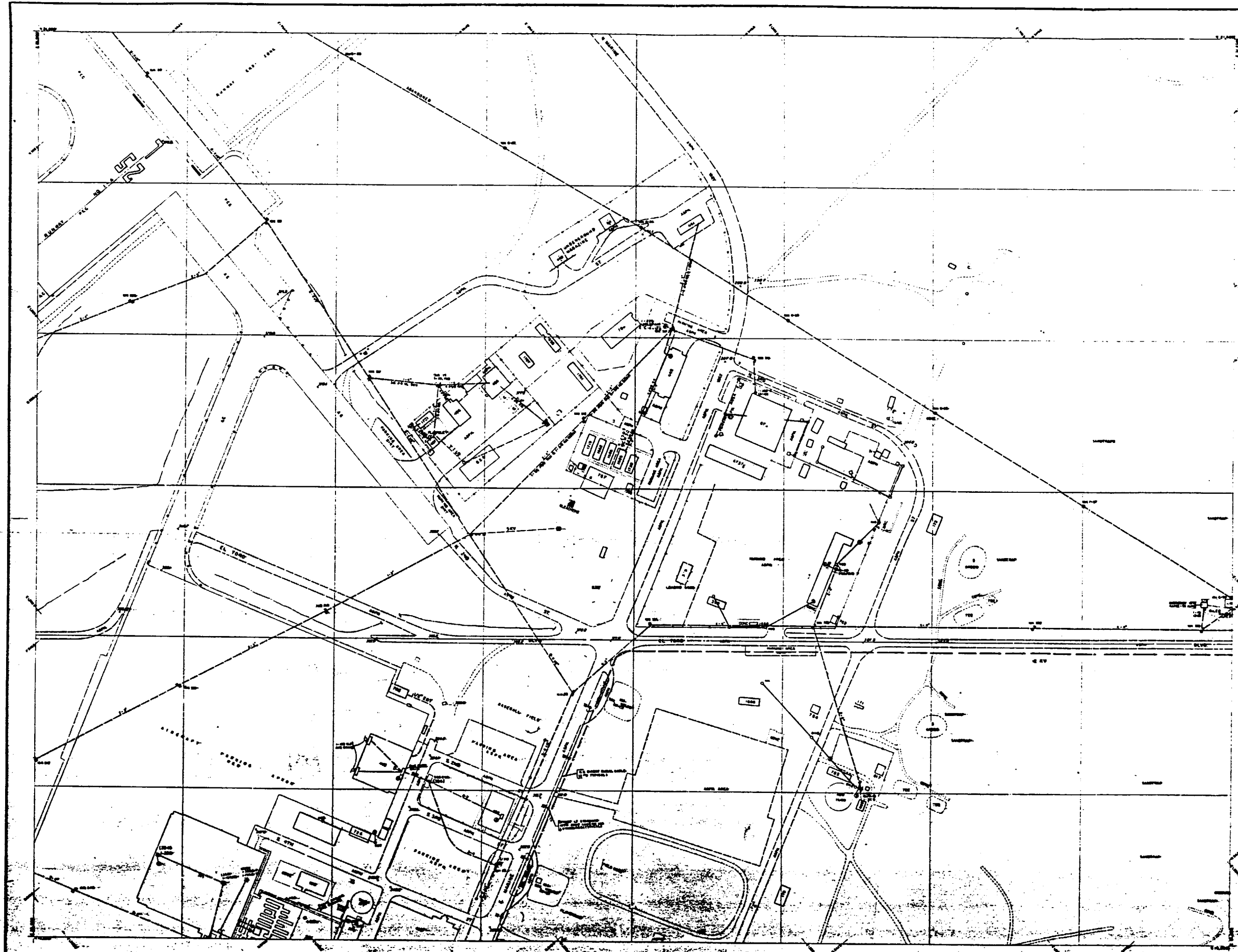
AREA 12  
WATER DISTRIBUTION

REVISED TO DATE 6-16-80	
BY 33084	
U.S. MARINE CORPS GIN STATION AT CAMP PENDLETON PUBLIC WORKS DEPARTMENT	
PROJECT NO. 4108	DATE 6-16-80
DESIGNED BY GVS	CHECKED BY GVS
DRAWN BY GVS	IN CHARGE BY GVS
APPROVED BY GVS	DATE 6-16-80









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6	7	8	9	10
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16	17	18	19	20
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SHEET INDEX

DESIGNED BY  
 Aerial Survey, Inc.  
 10000 10th Ave. N.E.  
 Seattle, Wash. 98125

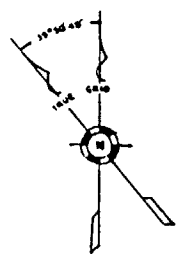
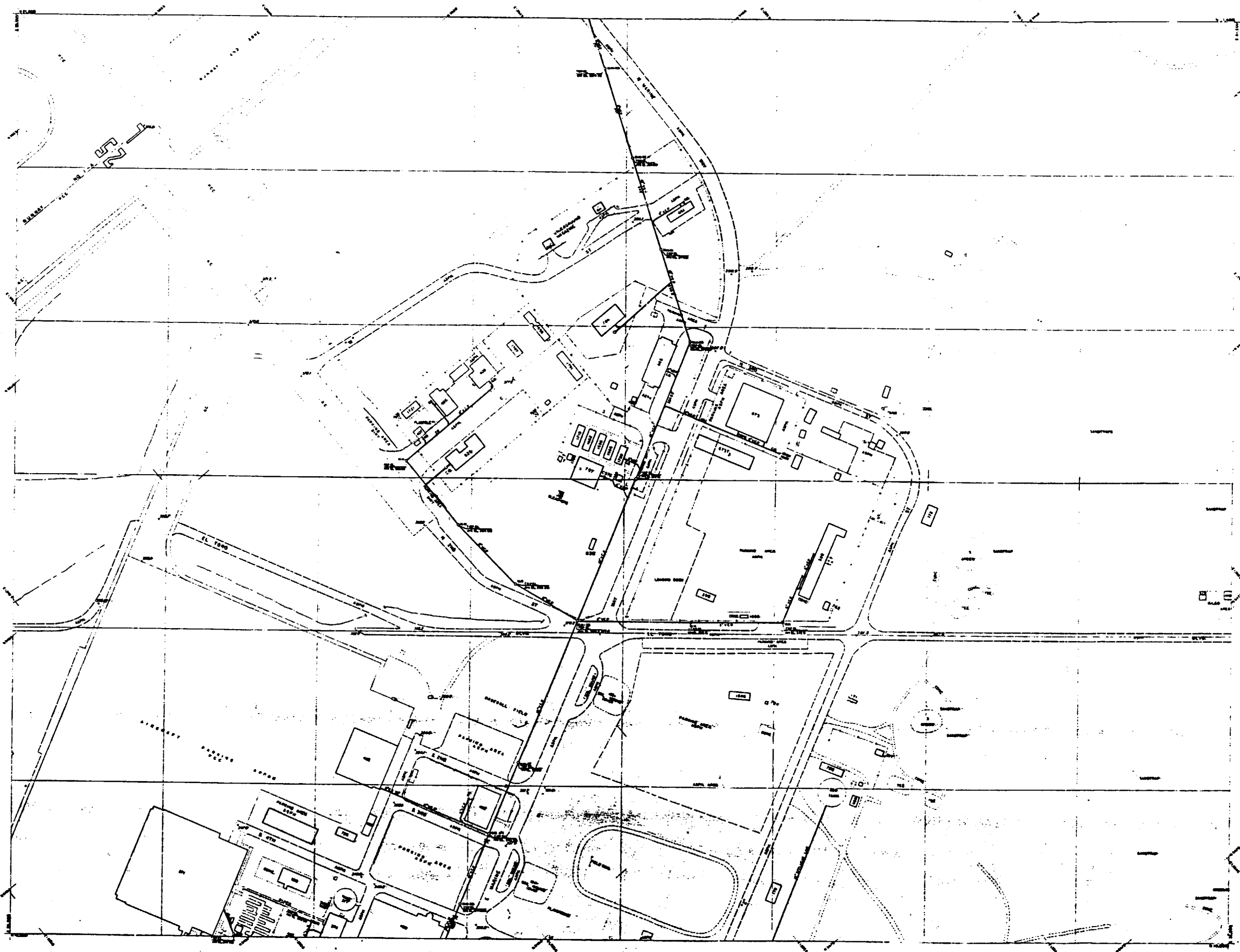
DRAWN BY  
 HAROLD LEWIS  
 ASSOCIATED ENGINEERS, INC.  
 10000 10th Ave. N.E.  
 Seattle, Wash. 98125

SCALE 1"=100'  
 0 100 200 300 400 500

NOTE THE LAST TWO DIGITS OF THE CALIF STATE PLANE COORDINATE  
 GRID HAS BEEN OMITTED THUS N 550.5 = N 550,500.

AREA 19  
 ELECTRICAL DISTRIBUTION

REVISED TO DATE 6-10-80	
U.S. MARINE CORPS AIR STATION	
PUBLIC WORKS DEPARTMENT	
PROJECT NO. 6313842	DATE 6-10-80



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SHEET INDEX

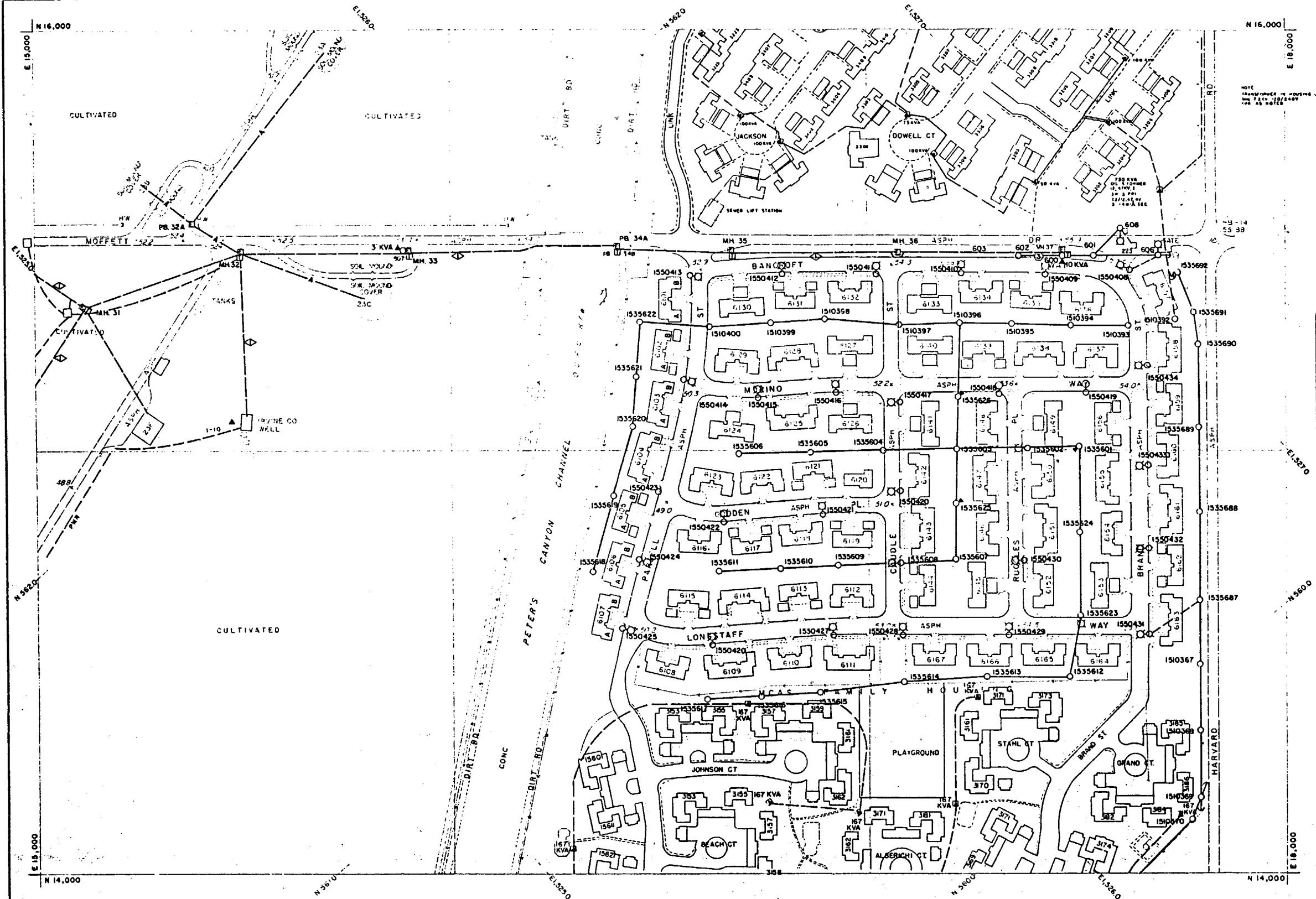
DESIGNED BY  
 DRAWN BY  
 CHECKED BY  
 APPROVED BY  
 DATE  
 SCALE  
 PROJECT NO.

SCALE 1:1200  
 NOTE THE LAST TWO DIGITS OF THE GRID SYSTEM PLANE COORDINATE  
 GRID HAS BEEN OMITTED THUS N 540.8 - N 500.800

AREA 19  
 SANITARY SEWER

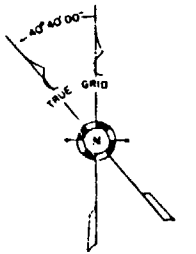
REVISED TO DATE		DATE
U.S. MARINE CORPS AMBITION		DATE
PUBLIC WORKS DEPARTMENT		DATE
PROJECT NO.		DATE
PROJECT NAME		DATE
PROJECT LOCATION		DATE
PROJECT DESCRIPTION		DATE
PROJECT STATUS		DATE
PROJECT COST		DATE
PROJECT BENEFITS		DATE
PROJECT RISKS		DATE
PROJECT IMPACTS		DATE
PROJECT MONITORING		DATE
PROJECT EVALUATION		DATE





SHEET INDEX

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13	14	15	

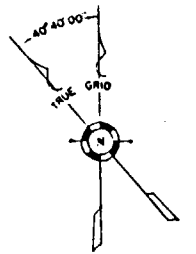
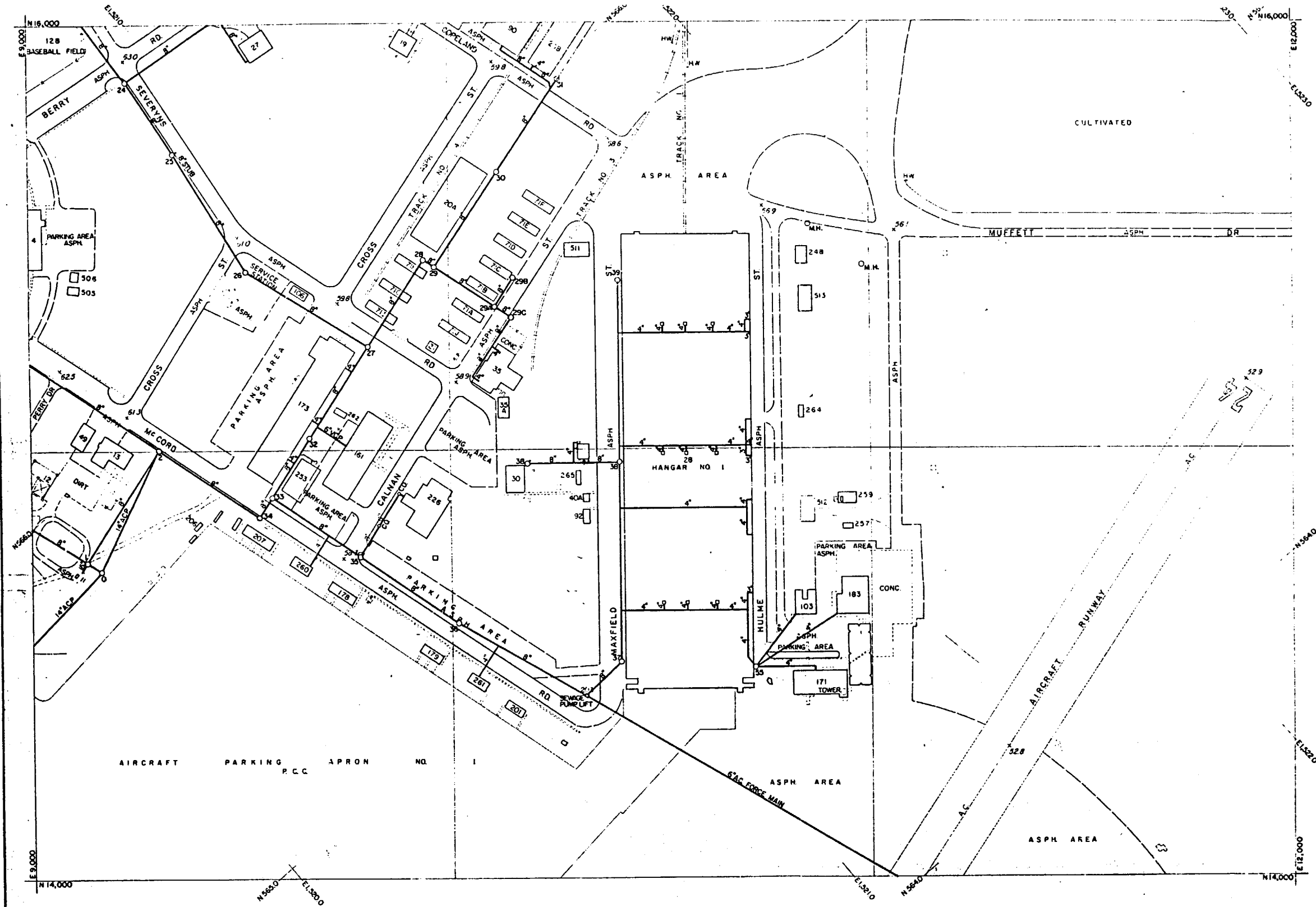


COMPILED BY  
**MALSBENDEN LEWIS ASSOCIATES/ENGINEERS INC.**  
 CONSULTING ENGINEERS  
 IRVINE, CA. 92714  
 MAP UPDATED AS OF 9-30-90

SCALE 1"=1,200'  
 0' 30' 60' 90' 120' 150' 180' 210' 240' 270' 300'  
 NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED. THUS N 5600 = N 5600,000

**AREA 8**  
**ELECTRICAL DISTRIBUTION**

REVISED TO DATE	3-14-91
REVISION	DATE
PROJECT: U.S. MARINE CORPS AIR STATION (HOLICROFT) DRAWN: GYA CHECKED: SLC DESIGNED: SLC DATE: 1-1-88 SCALE: 1"=1,200' SHEET NO. 831374	



4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	

SHEET INDEX

AMERICAN AERIAL SURVEYS, INC.  
11111 15th St., Suite 100  
Irvine, CA 92618  
Tel: 949-451-1111

MALCOLM LEWIS ASSOCIATES/ENGINEERS INC.  
CONSULTING ENGINEERS  
IRVINE, CA 92618  
Tel: 949-451-1111

SCALE 1"=1,200'

NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED. THUS N 5600 = N 560,000

**AREA 6 - SANITARY SEWERS**

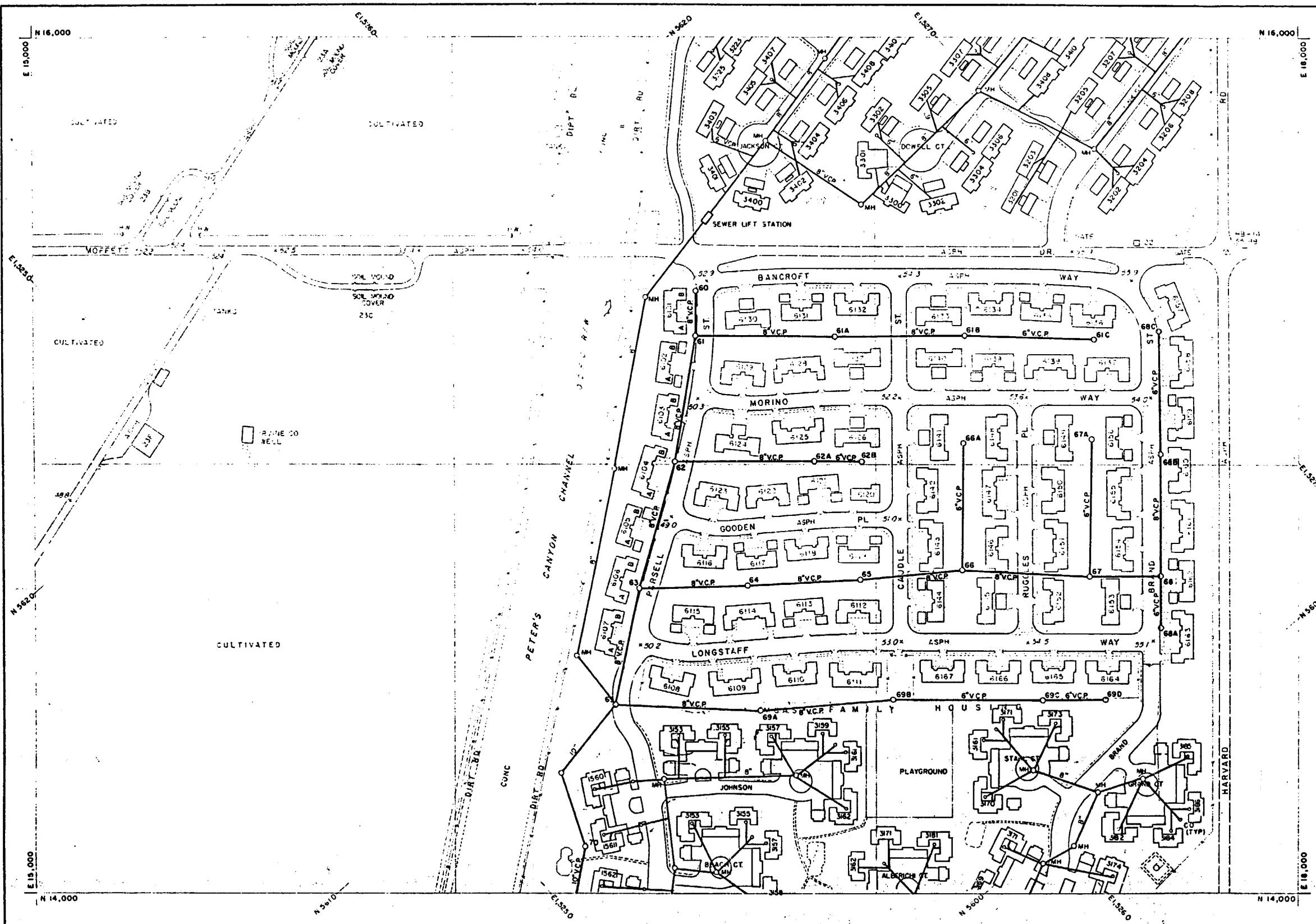
REVISED TO DATE		DATE
PROJECT		DATE
DESIGNED BY		DATE
CHECKED BY		DATE
APPROVED BY		DATE
PROJECT NO.		DATE
SHEET NO.		DATE
SHEET TOTAL		DATE

U.S. MARINE CORPS AIR STATION (HELICOPTER)  
CAMP PENDLETON  
PUBLIC WORKS DEPARTMENT

SCALE 1"=100'

DATE 8-1-88

PROJECT NO. 8340-20



SHEET INDEX

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	

COMPILED BY  
 AMERICAN AERIAL SURVEYS & INC.  
 10000 E. 15th Ave., Suite 100, Denver, CO 80231  
 (303) 751-1111

WALCOLM LEWIS  
 ASSOCIATED ENGINEERS INC.  
 CONSULTING ENGINEERS  
 IRVING, CA 92714  
 408 927-1111

SCALE 1"=1,200'

NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 5600 = N 560,000

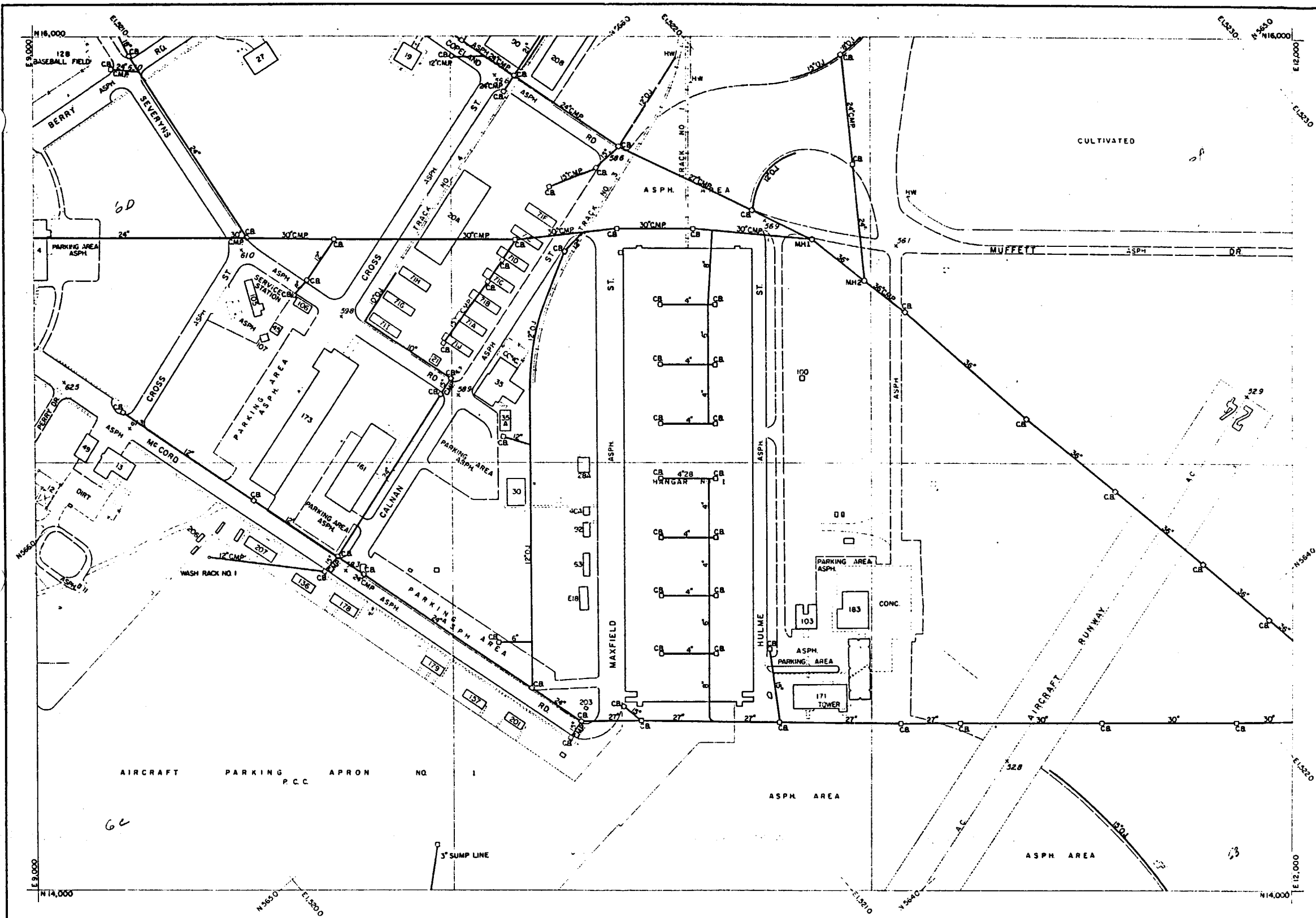
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SANITARY SEWERS**

REVISED TO DATE		DATE
PROJECT		DATE
DESIGNED BY		DATE
CHECKED BY		DATE
APPROVED BY		DATE
PROJECT NO.		DATE
SHEET NO.		DATE
SHEET TOTAL		DATE
PROJECT NO.		DATE
SHEET NO.		DATE
SHEET TOTAL		DATE

U.S. MARINE CORPS AIR STATION (HELICOPTER)  
 PUBLIC WORKS DEPARTMENT

6314023





SHEET INDEX

4	3	2	1
5	6	7	8
12	11	10	9
13	14	15	

COMPILED BY  
**American**  
 AERIAL SURVEYS, INC.  
 1000 W. 10TH STREET, SUITE 100  
 LOS ANGELES, CALIF. 90015  
 TELEPHONE (213) 475-1111

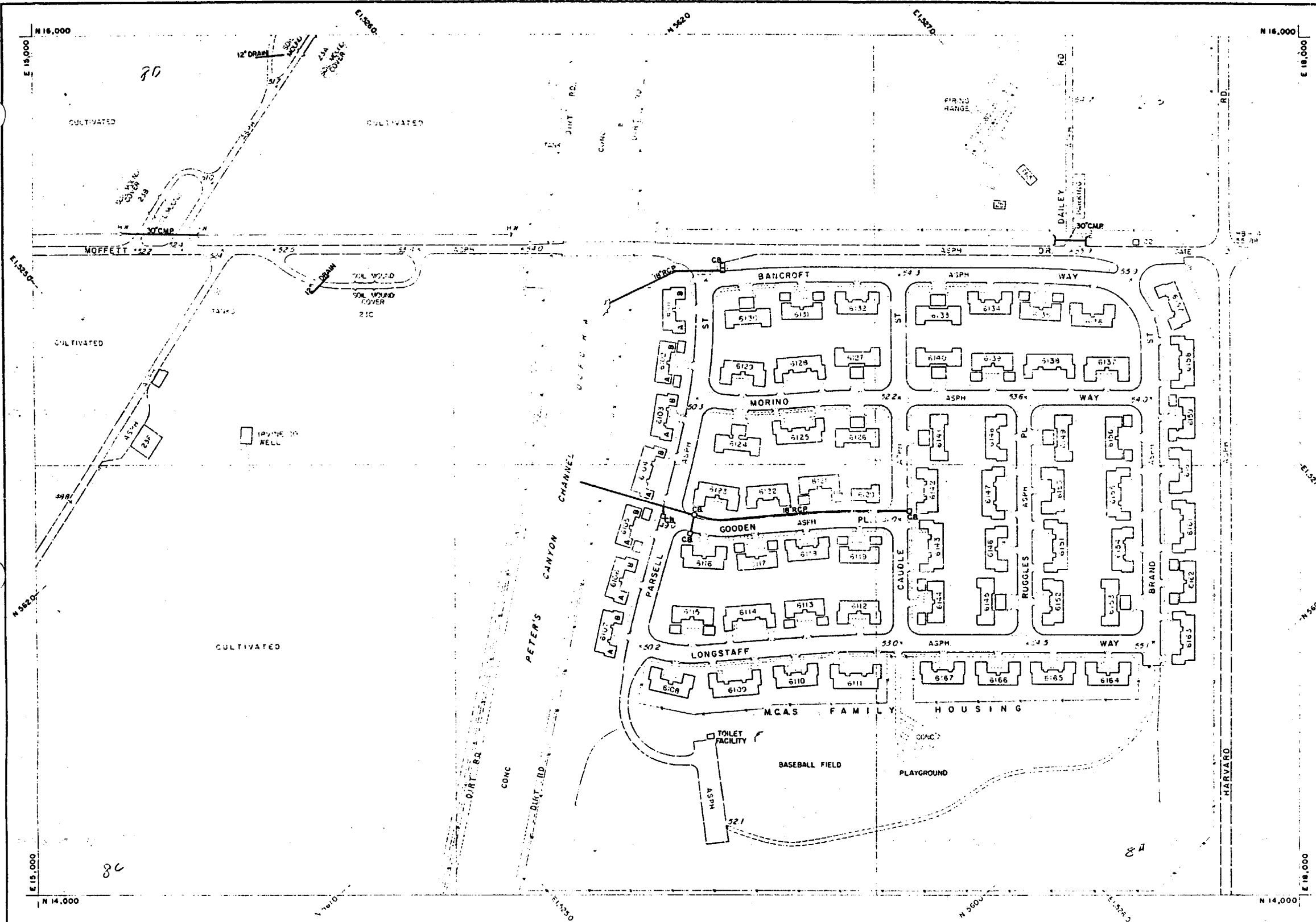
SCALE 1"=1,200'

NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 5600 N 560,000

**AREA 6**  
**STORM SEWERS**

PROJECT NO.	DATE	APPROVED
U.S. MARINE CORPS AIR STATION (HELICOPTER) PUEBLO, COLORADO PUBLIC WORKS DEPARTMENT		
DESIGNED BY	DATE	
CHECKED BY	DATE	
APPROVED BY	DATE	
DESIGN SUPERVISOR	DATE	
REVISIONS	DATE	
BY	DATE	
REVISION	DATE	





SHEET INDEX

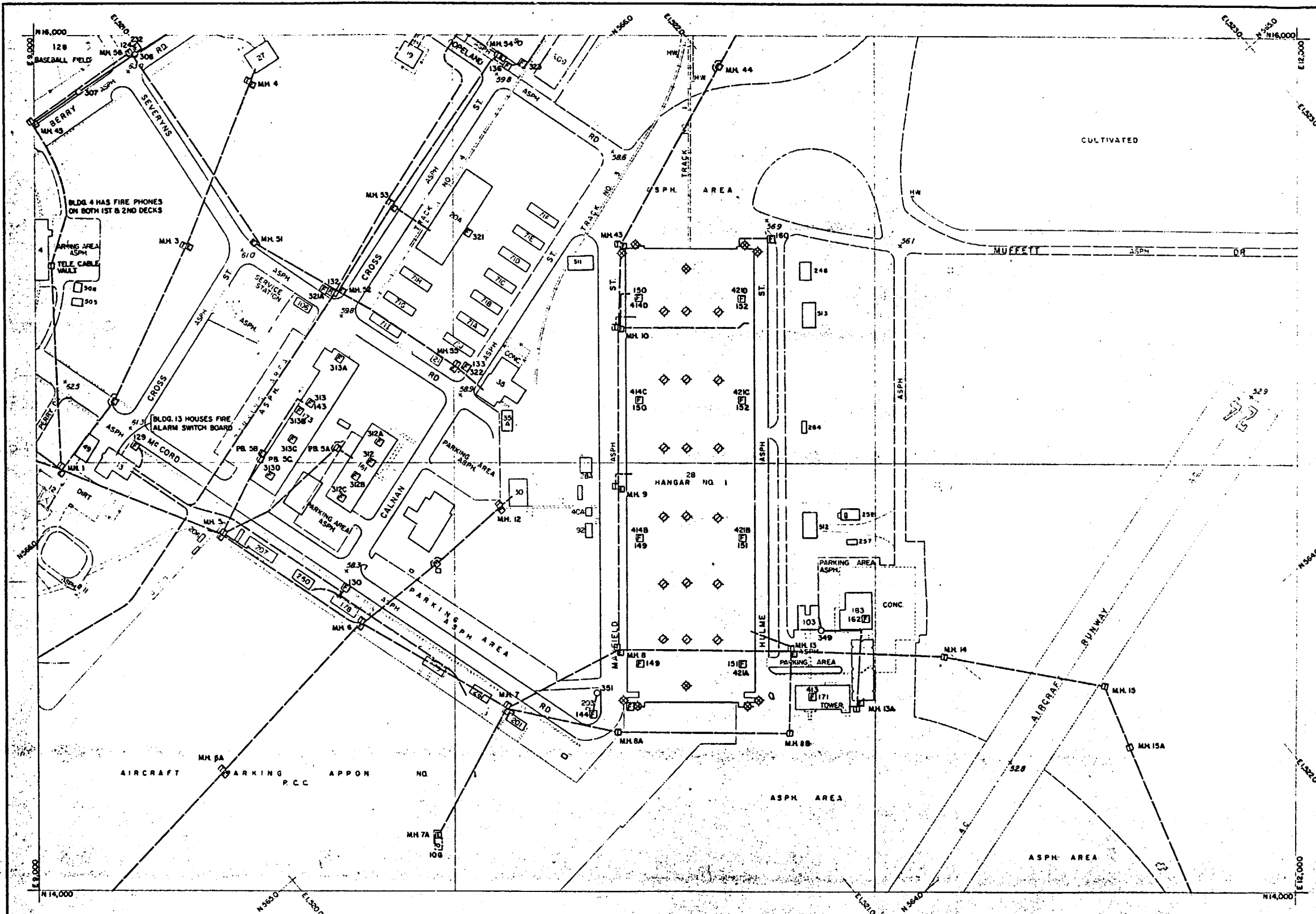
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12	11	10	9
13	14	15	

SCALE 1"=1,200'

NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE  
HAS BEEN OMITTED. THUS N 5600 = N 560,000

AREA-8  
STORM SEWERS

DATE	11-15-78
BY	AMERICAN AERIAL SURVEYS, INC.
FOR	U.S. MARINE CORPS AIR STATION (HELICOPTER)
PROJECT	PUBLIC WORKS DEPARTMENT
DESCRIPTION	
APPROVED	
DATE	



SHEET INDEX

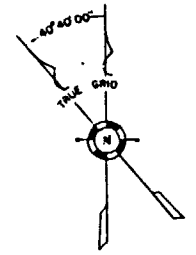
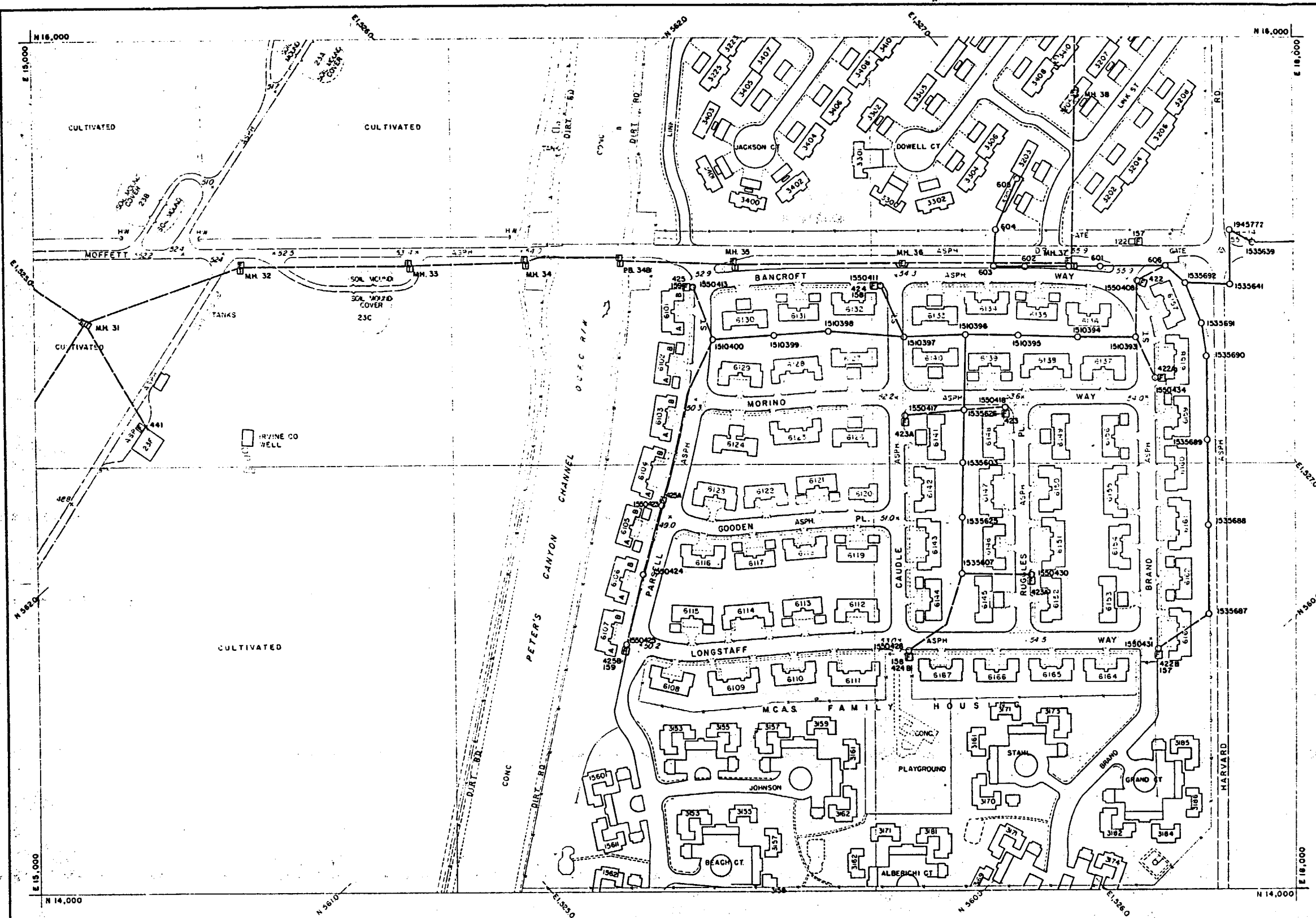
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12	11	10	9
13	14	15	

COMPILED BY  
  
 AMERICAN SURVEYORS, INC.  
 1115 - 19 - 76

SCALE 1"=1,200'  
 100' 50' 0 100' 200' 300' 400' 500'  
 NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 5600 = N 560,000

AREA 6  
 COMMUNICATION & FIRE ALARM

DATE	REVISION
U.S. MARINE CORPS AIR STATION (HELICOPTER)	
PUBLIC WORKS DEPARTMENT	
DESIGNED BY	CHECKED BY
DRAWN BY	APPROVED BY
DATE	DATE
SCALE 1"=100'	DATE



4	3	2	1
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13	14	15	

SHEET INDEX

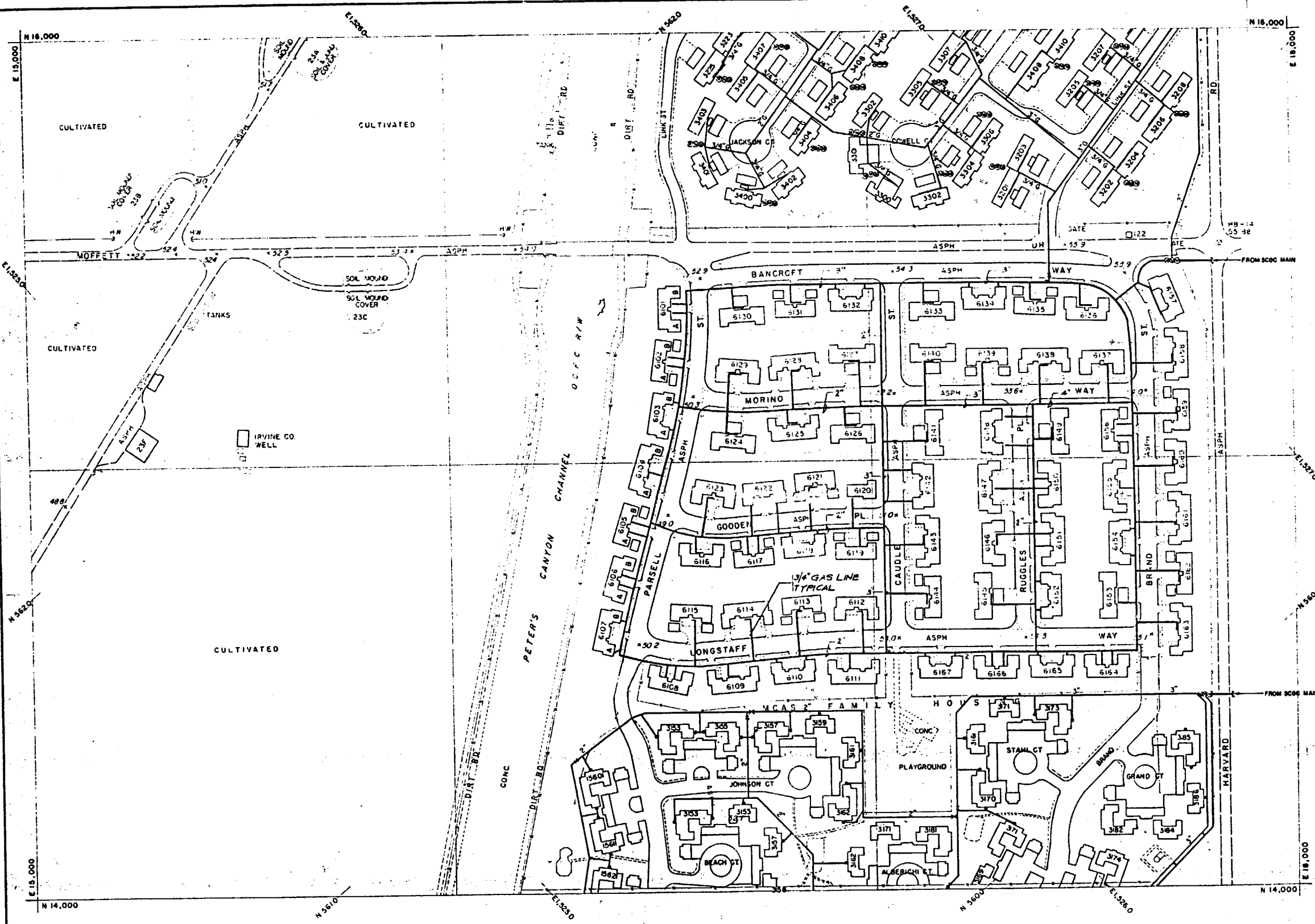
COMPILED BY  
**Amesbury**  
 AERIAL SURVEYS, INC.  
 100 WEST HAVEN AVENUE  
 HAVEN, CONNECTICUT 06424  
 PHONE 203-261-1111

SCALE 1:1,200  
 100' 50' 0' 100' 200' 300' 400' 500'  
 NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED. THUS N 5600 = N 560,000

**AREA 8  
 COMMUNICATION  
 & FIRE ALARM**

SYMBOL	DESCRIPTION	DATE	APPROVED
U.S. MARINE CORPS AIR STATION (HELICOPTER) PUBLIC WORKS DEPARTMENT			
DESIGNED BY	DATE		
DRAWN BY	DATE		
CHECKED BY	DATE		
IN CHARGE	DATE		
APPROVED BY	DATE		
REVISIONS			
NO.	DATE	BY	REASON
1			





SHEET INDEX

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13	14	15	

COMPILED BY  
 AMERICAN AERIAL SURVEYS, INC.  
 11-15-78

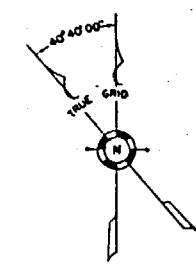
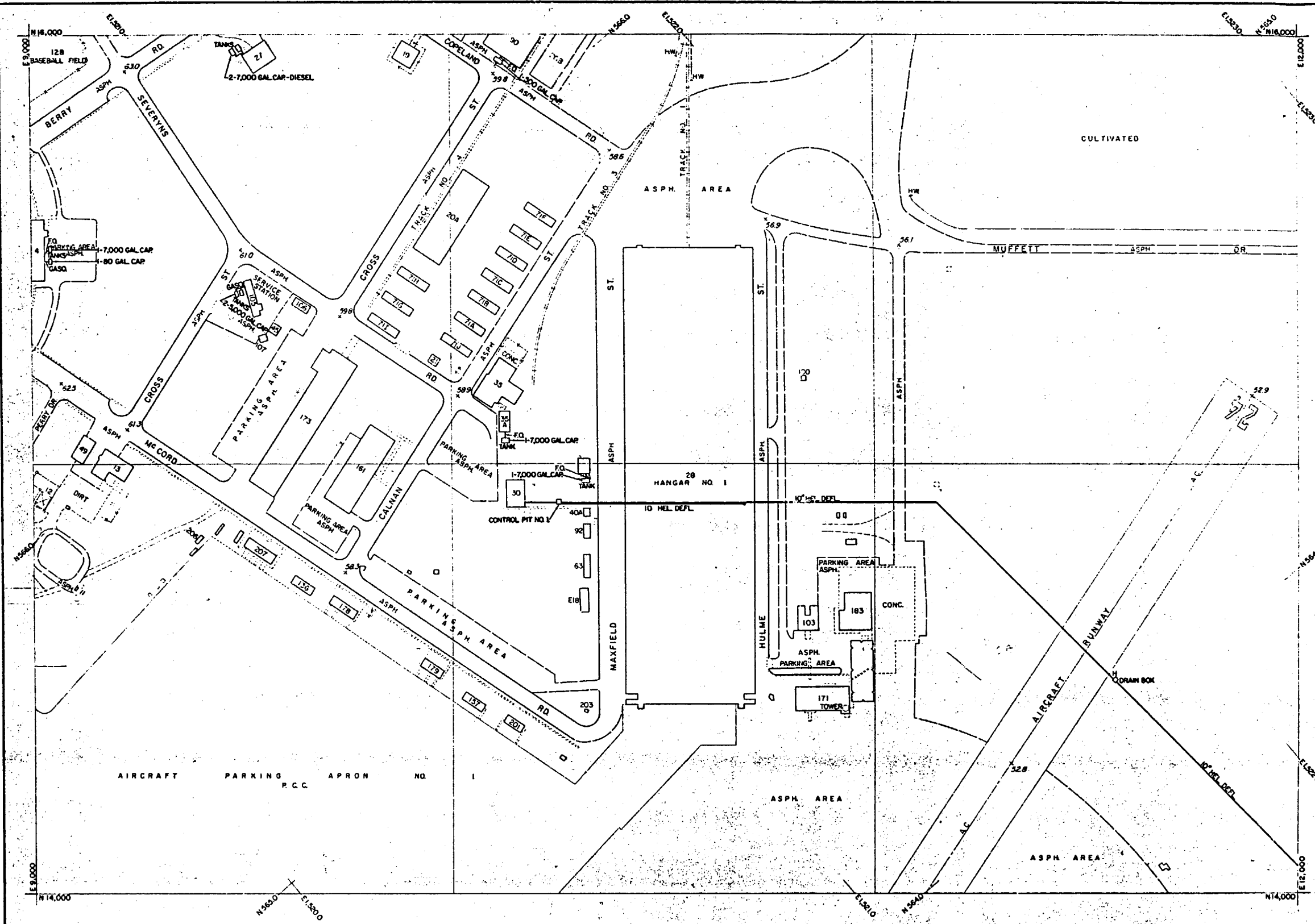
MADELM LEMIS  
 ASSOCIATES/ENGINEERS INC.  
 CONSULTING ENGINEERS  
 IRVINE, CA. 92718  
 MAP UPDATED AS OF 9-10-90

SCALE 1"=200'

NOTE THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED. THUS N 3600 = N 560,000

AREA 8  
 NATURAL GAS DISTRIBUTION

REVISED	4-14-88
REVISED TO DATE	93088
BY	
FOR	
PROJECT	U.S. MARINE CORPS AIR STATION (HELICOPTER)
DESIGNED BY	KLIC
CHECKED BY	
DATE	
SCALE	1"=100' (AS SHOWN)
PROJECT NO.	431378



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SHEET INDEX

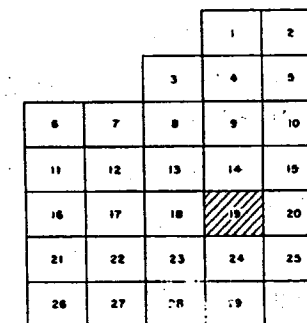
COMPILED BY  
**American**  
 SURVEYING, INC.  
 10000 WILSON BLVD., SUITE 100  
 BELLFLOWER, CALIF. 91706  
 PHONE (714) 851-1100

SCALE 1"=1,200'  
 100' 50' 0' 100' 200' 300' 400' 500'  
 NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 5600 = N 560,000.

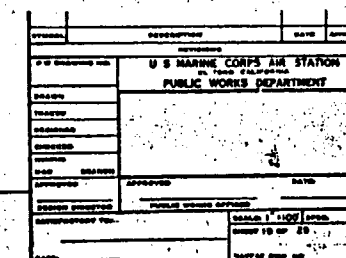
**AREA 6  
 GASOLINE FUEL OIL & HELIUM  
 DISTRIBUTION SYSTEMS**

DATE	11/15/60
BY	W. J. HARRIS
U.S. MARINE CORPS AIR STATION (HELICOPTER)	
PUBLISHERS DEPARTMENT	
APPROVED	DATE
W. J. HARRIS	11/15/60
PUBLISHERS DEPARTMENT	
DATE	11/15/60
BY	W. J. HARRIS





**SHEET NO.**

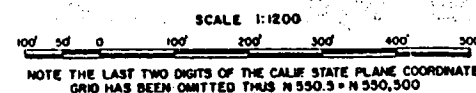
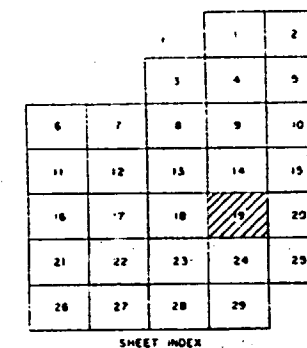


AREA 19  
STORM SEWERS

SCALE 1:1200

NOTE THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE  
ONE HAS BEEN OMITTED THIS IS M 550 3 = M 550.500

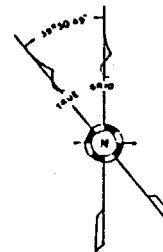
COMPILED BY:  
**American**  
AERIAL SURVEYS, INC.  
100 WEST STREET NEW YORK, CALIFORNIA  
Telephone BR 10-29-70



**AREA 19**  
**WATER DISTRIBUTION**

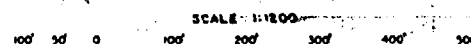
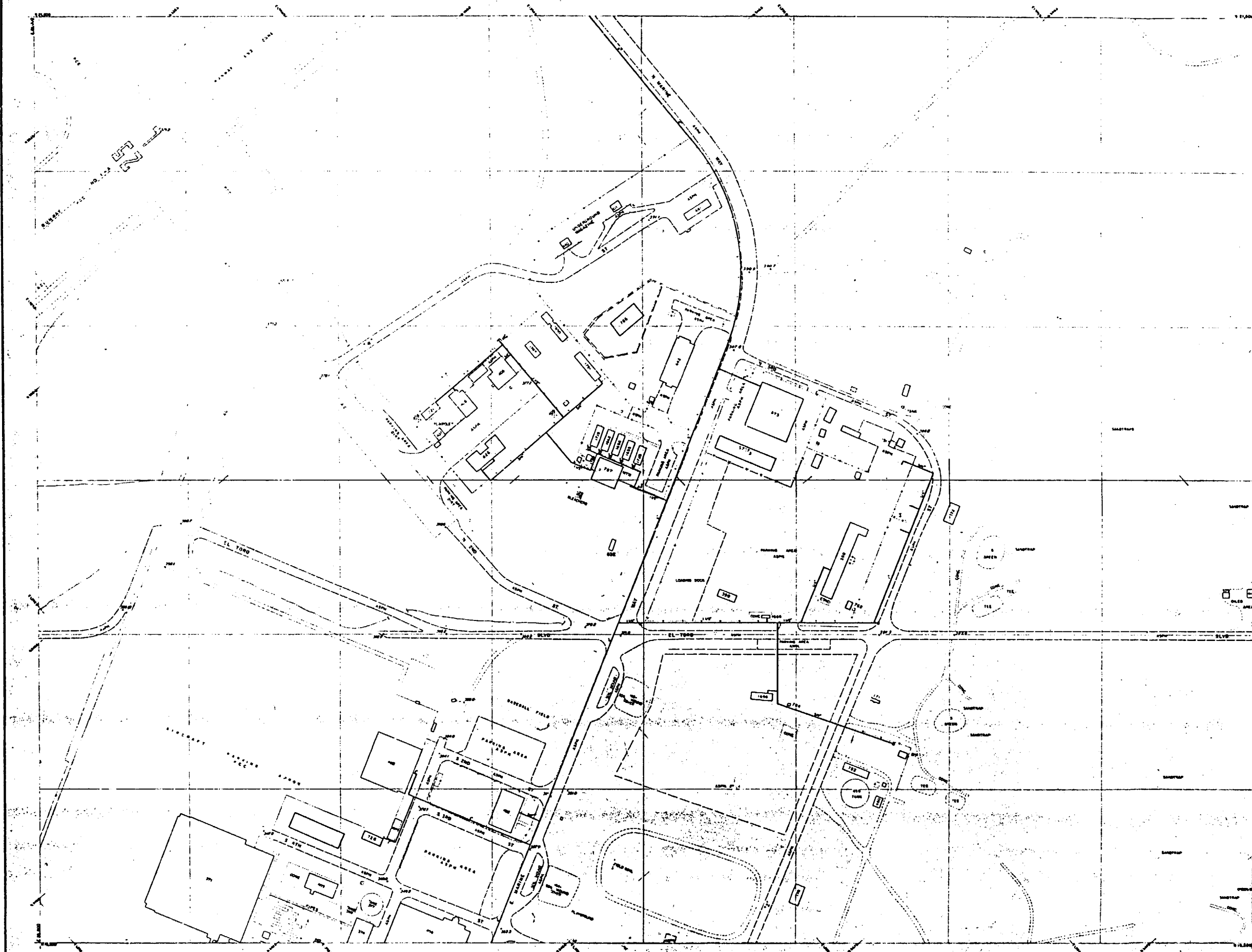
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SHEET 12



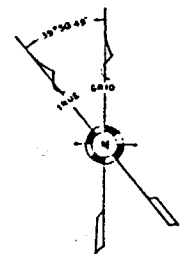
NOTE THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 550.3 = N 550,300

COMPILED BY  
**American**  
ALBERT SURVEYS, INC.  
200 SOUTH STREET, SUITE 200  
IRVINE, CALIF. 92714  
TELEPHONE 949-251-1111

**MALCOLM LEWIS**  
ASSOCIATES/ENGINEERS INC.  
CONSULTING ENGINEERS  
IRVINE, CA. 92714  
MAP UPDATED AS OF 9-18-80

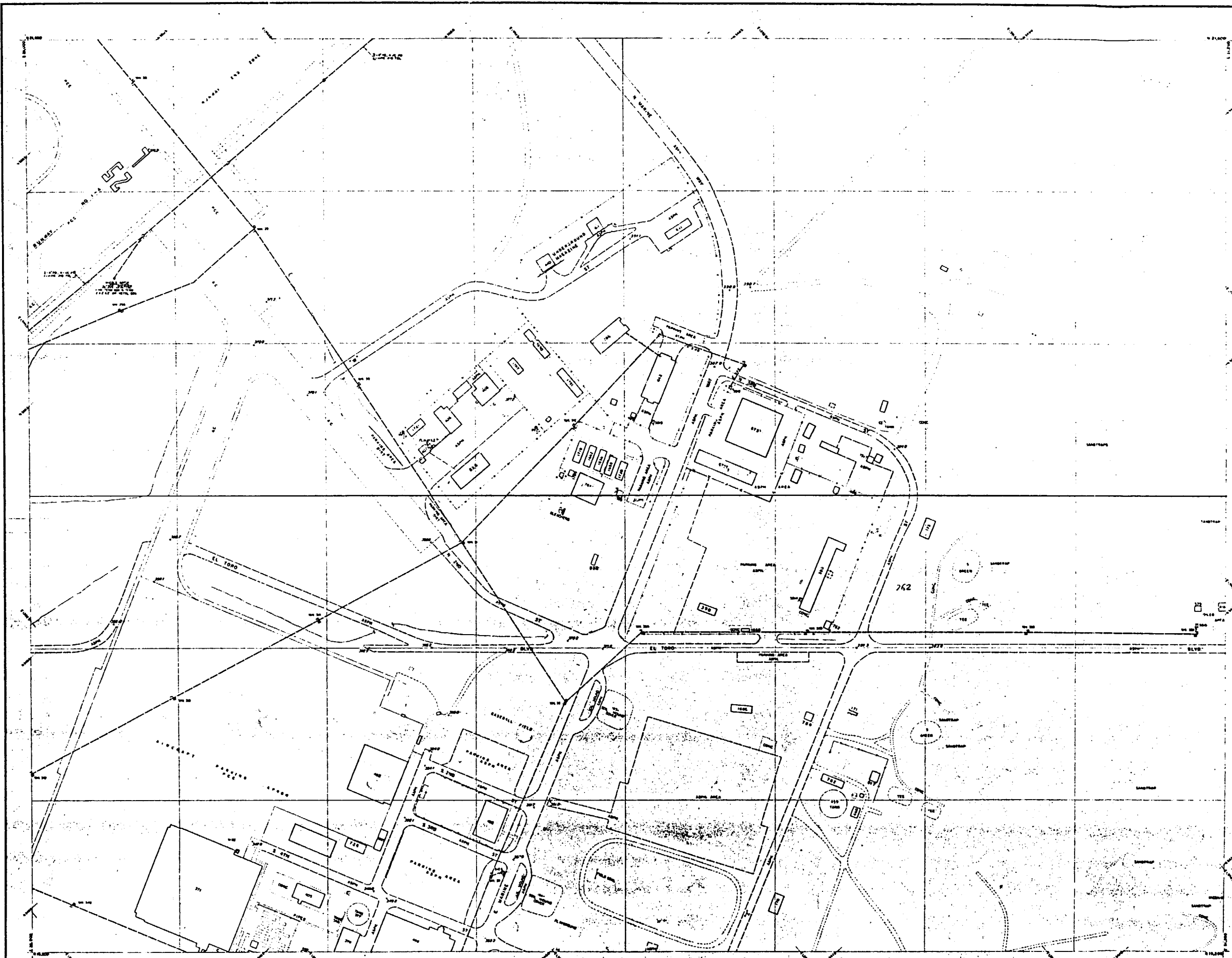
AREA 19  
NATURAL GAS DISTRIBUTION

REVISED TO DATE		4-16-85
SYMBOL	DESCRIPTION	DATE
REVISIONS		
U.S. MARINE CORPS AIR STATION		
PUBLIC WORKS DEPARTMENT		
DESIGNED BY	DATE	
DRAWN BY	DATE	
CHECKED BY	DATE	
APPROVED BY	DATE	
PROJECT NO. 8313903		



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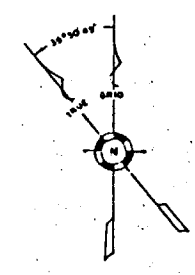
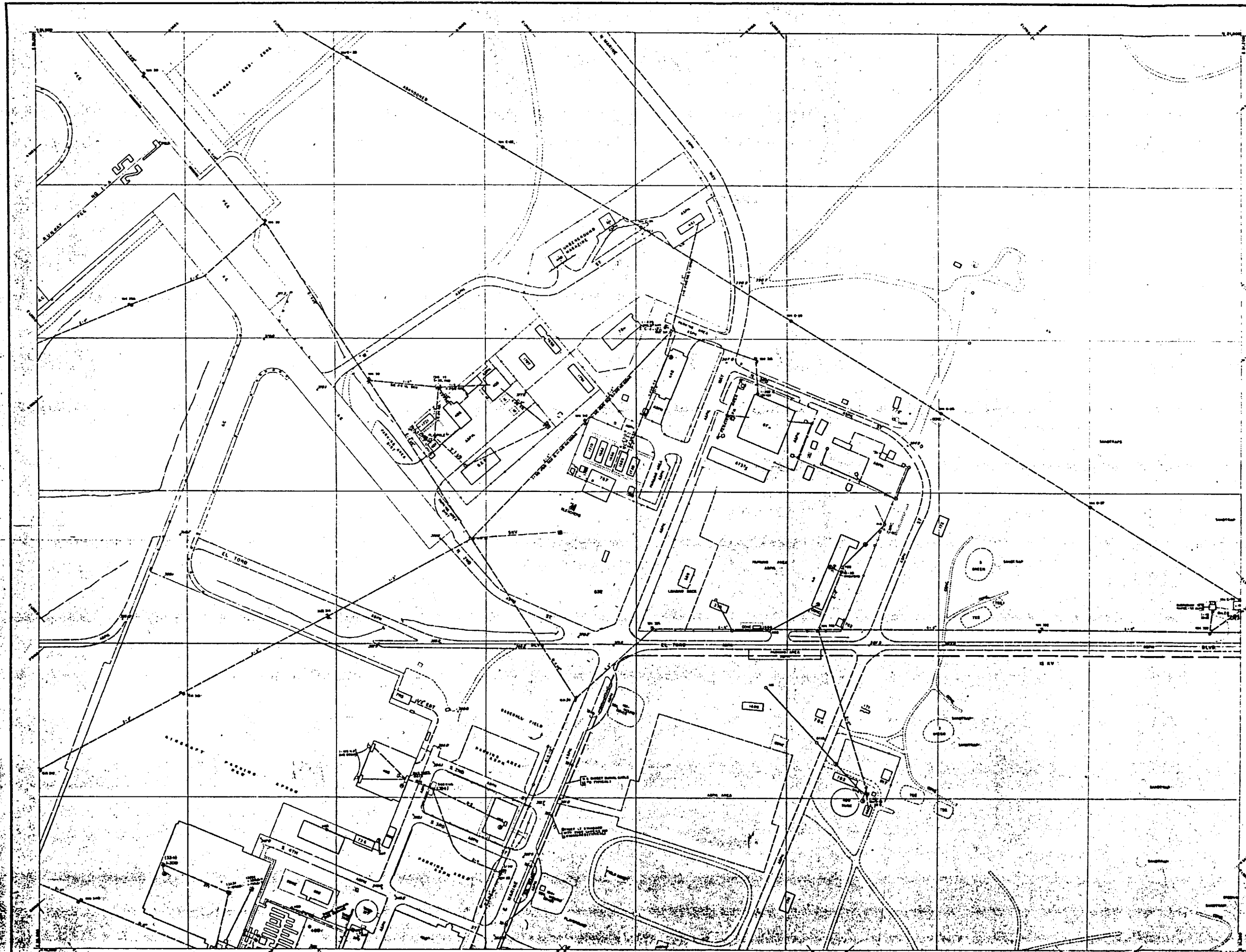
COMPILED BY  
**Aerial Surveys, Inc.**  
200 WEST STREET, SUITE 200, IRVINE, CALIF. 92714  
TELEPHONE (714) 261-1111

**MALCOLM LEWIS ASSOCIATES/ENGINEERS, INC.**  
CONSULTING ENGINEERS  
IRVINE, CALIF. 92714  
MAP UPDATED 23 OF 3-50-56

SCALE: 1"=1200'  
NOTE: THE LAST TWO DIGITS OF THE CALIF. STATE PLANE COORDINATE GRID HAS BEEN OMITTED THUS N 550.5 = N 550,500

**AREA 19  
COMMUNICATION  
& FIRE ALARM**

REVISED TO DATE 9-10-56	
BY	DATE
U.S. MARINE CORPS AIR STATION	
PUBLIC WORKS DEPARTMENT	
PROJECT NO. U 4104	
DESIGNED BY CVA	
DRAWN BY	
CHECKED BY ALO	
APPROVED BY	
DATE 9-10-56	
6313873	



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26	27	28	29	

SHEET INDEX

COMPILED BY  
**Aerial Surveys, Inc.**  
1000 South Street, Suite 100, San Diego, California 92108  
Photography dated 10-28-70

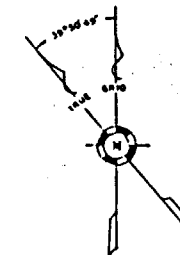
MALCOLM LEWIS  
ASSOCIATES/ENGINEERS INC.  
CONSULTING ENGINEERS  
10000 S. 16th St., San Diego, CA 92128  
MAP UPDATED AS OF 6-10-88

SCALE 1:12000  
100' 50' 0' 100' 200' 300' 400' 500'

NOTE: THE LAST TWO DIGITS OF THE CALIF STATE PLANE COORDINATE  
GRID HAS BEEN OMITTED THUS N 550.3 = N 550,300

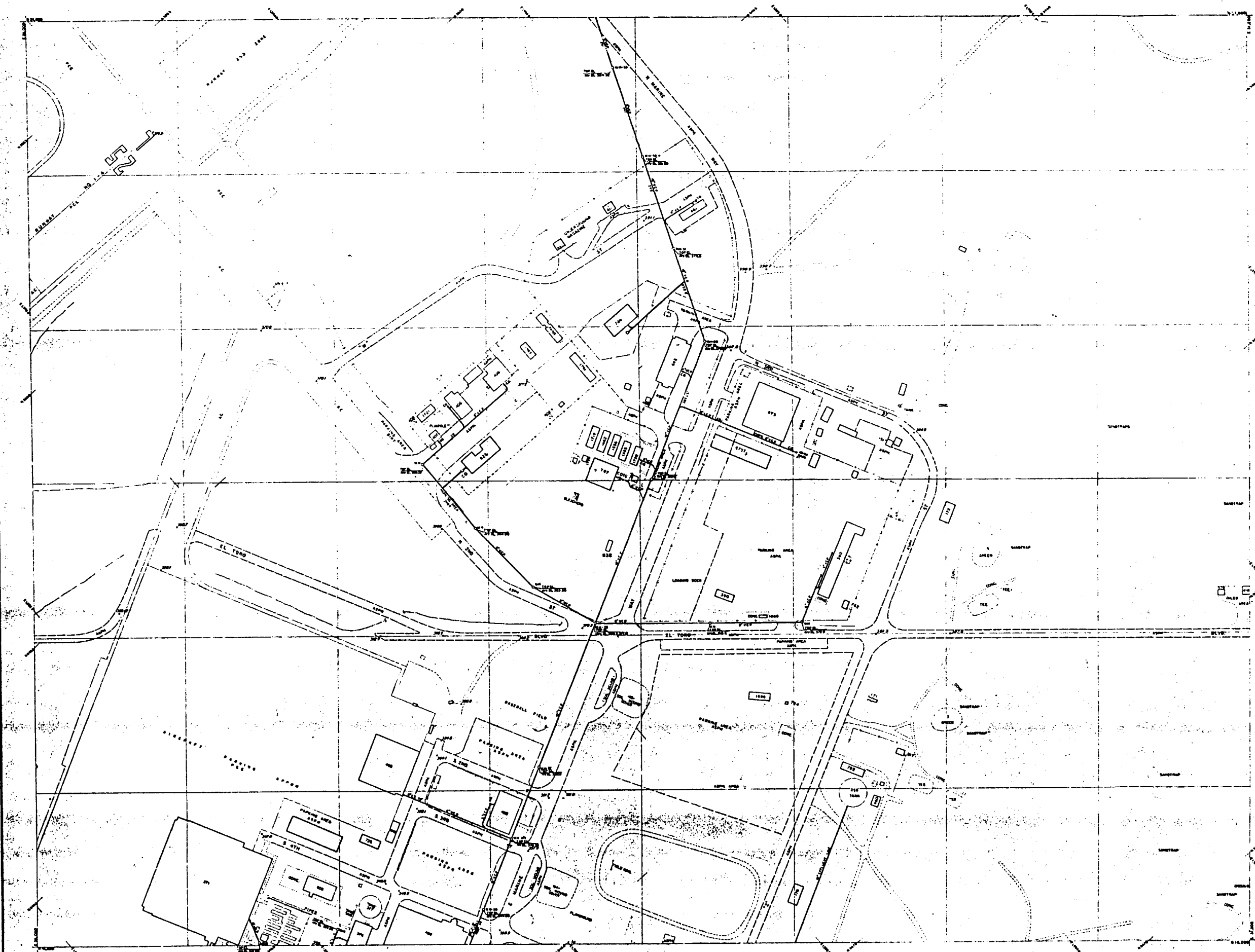
**AREA 19:**  
**ELECTRICAL DISTRIBUTION**

REVISED TO DATE 6-10-88	
U.S. MARINE CORPS AIR STATION PUBLIC WORKS DEPARTMENT	
PROJECT NO. 19-001	DATE 6-10-88
DESIGNER: [Signature]	APPROVED: [Signature]
6313842	



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11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

SHEET INDEX



SCALE 1:1200

NOTE THE LAST TWO DIGITS OF THE CALIF STATE PLANE COORDINATE GRID HAS BEEN OMITTED. THUS N 550.5 = N 550,500.

COMPILED BY  
**AMERICAN AERIAL SURVEYS, INC.**  
200 PINE STREET, SUITE 200, OAKLAND, CALIF. 94612  
TELEPHONE (415) 761-1100

DESIGNED BY  
**MALCOLM LEWIS ASSOCIATES/ENGINEERS INC.**  
10000 E. 12TH AVE., SUITE 100, DENVER, CO. 80231  
TELEPHONE (303) 751-1100

**AREA 19  
SANITARY SEWER**

REVISED TO DATE		6-10-88
BY		ALP
FOR		U.S. MARINE CORPS AIR STATION
PROJECT		PUBLIC WORKS DEPARTMENT
DESIGNED BY	ALP	
CHECKED BY	RLC	
APPROVED BY	RLC	
DATE	6-10-88	

# APPENDIX

## C



# APPENDIX

## D

UNIFORM HAZARDOUS  
WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest  
Document No.

2. Page 1

Information in the shaded areas  
is not required by Federal law.

3. Generator's Name and Mailing Address

CA 61700232080199H

A. State Manifest Document Number

90131476

EL TORO/MCAS

Code 136, Santa Ana, CA 92709

4. Generator's Phone ( )

B. State Generator's ID

5. Transporter 1 Company Name

Sturgeon & Sons

6. US EPA ID Number

CA D 004778742

C. State Transporter's ID

100019

7. Transporter 2 Company Name

Northwest EnviroService, Inc

D. Transporter's Phone

(805) 322-4408

F. Transporter's Phone

9. Designated Facility Name and Site Address

Northwest EnviroService, Inc  
1500 Airport Way South  
Seattle, WA 98134

10. US EPA ID Number

G. State Facility's ID

H. Facility's Phone

emergency contact

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

12. Quantity Unit Wt/Vol Waste No.

a.	No.	Type	Quantity	Unit Wt/Vol	Waste No.
X Waste Bleaching powder ORM-C, UN2208	2	DM	519	P	WT02-181
RQ Waste Paint Flammable liquid, UN 1263 (D001)	4	DM	1530	P	WT02 461 D001 E1004-E007 EC F003-F005
RQ Waste Paint Related Material Flammable liquid, NA 1263 (D001)	1	DM	55	G	State D001 F005 WT EPA/Other 214
RQ Waste Turpentine Flammable liquid, UN 1299 (D001)	1	DM	55	G	State WT01-343

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

- a) WFO 25110 - CLIN 5604 - CHLORINE BLEACHING POWDER - HWP-D (3,23)
- b) WFO 25111-CLIN 4733-PAINT W/SOLVENTS-F-SER (7,23)
- c) WFO 25112-CLIN 4700-MEK W/PAINT THINNER- F-SER (9)
- d) WFO 25113-CLIN 2305-1208 (11)

a) SOIC, T31T  
b,c,d) SOIC, SOAT, TSOT

15. Special Handling Instructions and Additional Information

16.

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name

Signature

Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

JAMES RUSSELL

Signature

James Russell

Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Signature

Month Day Year

William K DENIKE

William K Denike

07 23 90

Do Not Write Below This Line

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL  
DISASTER CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550



JO-89-D-0004

Delivery Order 0190

JOB# 16318

(Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-91

**ORM HAZARDOUS  
WASTE MANIFEST  
(Continuation Sheet)**

21. Generator's US EPA ID No.

Manifest Document No.

22. Page

Information in the shaded  
areas is not required by Federal  
law.

CA6170023208

0199H

2  
of 4

23. Generator's Name

L. State Manifest Document Number

El Toro/ MCAS

M. State Generator's ID

Code 1J6, Santa Ana, CA 92709

(714) 726-2221

24. Transporter Company Name

25. US EPA ID Number

N. State Transporter's ID

O. Transporter's Phone

26. Transporter Company Name

27. US EPA ID Number

P. State Transporter's ID

Q. Transporter's Phone

28. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

29. Containers

30. Total  
Quantity31. Unit  
Wt/VolR.  
Waste No.

No.

Type

a.	RM	Waste Flammable Liquid, n.o.s. (Isopropanol, Ethanol). Flammable liquid, UN1993. (D001)	1	DM	40	G	D001 WT02 212
b.	X	Waste Combustible Liquid, n.o.s. (Kerosene). Combustible liquid, NA1993.	1	DM	55	G	WT01 343
c.	X	Waste Compound, Cleaning Liquid. Corrosive material, NA1760.	2	DM	70	G	WT02 133
d.	X	Hazardous Waste Liquid, n.o.s. (Trichlorotrifluoroethane). ORM-E, NA9188.	1	DM	55	G	F002 WP01 741
e.	RM	Waste naphtha. Flammable liquid, UN2553. (D001)	1	DM	55	G	D001 WT02 213
f.		Non-RCRA Hazardous Waste Liquid.	5	DM	275 <del>0.4</del> 220	G	WT02
g.	RM	Waste Chromic Acid, Solution. Corrosive material, UN1755. ( <del>D001</del> , D002)	4	DM	220 <del>0.4</del> 275	G	D002 D007 WT02 792
h.		Non-Hazardous Waste Liquid.	8	DM	440	G	
i.	RM	Waste Flammable Liquid, n.o.s. (Naphtha). Flammable liquid, UN1993. (D001)	1	DM	85	G	D001 F002 F001 WP01 211

S. Additional Descriptions for Materials Listed Above

T. Handling Codes for Wastes Listed Above

- a) WPQ 25114 - CLIN 2314 - ISOPROPYL ALCOHOL W/ETHYL ALCOHOL - 120-B (13)
- b) WPQ 25115 - CLIN 3920 - KEROSENE CONT W/WATER - OP-A (15)
- c) WPQ 25116 - CLIN 4553 - WASTE CLEANING COMPOUND - API (17,147) *clnt 57 Det*
- d) WPQ 25117 - CLIN 4531, 4535 - 112 TRICHLORO 122 TRIFLUOROETHANE (FREON)

- C) SCIC, T2IT
- b,f,d) SCIC, SC3T, T44T
- a,e,i) SCIC, SC3T, T50T
- g) SCIC, T3IT, T23T
- h) SCIC, T23T

32. Special Handling Instructions and Additional Information - RCL, ROMIC (21) III e) WPQ 21429 - CLIN 3909 - - 120-B (27)

- f) WPQ 20438 - CLIN 6012 - ETHYLENE GLYCOL - RCL (29,48,96,145)
- g) WPQ 22222 - CLIN 1305,1310 - ALODINE - HWP-A (31,33,35)
- h) WPQ 25118 - CLIN 6005 - CALCIUM HYDROXIDE, POLYMER, WATER - WTP-A (38,42,121)
- i) WPQ 25119 - CLIN 4505 - SOLVENT W/FUEL - 120-B (40)

TRANSPORTER	33. Transporter Acknowledgement of Receipt of Materials		Date
	Printed/Typed Name	Signature	Month Day Year
GENERATOR	34. Transporter Acknowledgement of Receipt of Materials		Date
	Printed/Typed Name	Signature	Month Day Year
FACILITY	35. Discrepancy Indication Space		

UNIFORM HAZARDOUS  
WASTE MANIFEST

1. Generator's US EPA ID No. C.A.B.I.L.7.0.0.2.5.2.0.4.8	Manifest Document No. C.I.1.0.1.1.0	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
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3. Generator's Name and Mailing Address EL TORO MARINE CORPS AIR STATION BUILDING 368 ENVIRONMENTAL DEPARTMENT (113) EL TORO CA 92709-5006 (714) 726-6606		A. State Manifest Document Number 89915783
4. Generator's Phone ( )	5. Transporter 1 Company Name Environmental Dynamics	B. State Generator's ID H.V.H.10.13.16.1-10.17.10.19.18.17
6. US EPA ID Number C.A.D.9.8.5.1.1.5.6.7.7	7. Transporter 2 Company Name	C. State Transporter's ID
8. US EPA ID Number	9. Designated Facility Name and Site Address CHEMICAL WASTE MNGT. (KETTLEMAN HILLS) 35251 OLD SKYLINE ROAD KETTLEMAN CA 93239	D. Transporter's Phone (213) 835-5181
10. US EPA ID Number C.A.T.0.0.0.6.4.6.1.1.7		E. State Transporter's ID
		F. Transporter's Phone
		G. State Facility's ID
		H. Facility's Phone (800) 442-5206

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers		13. Total Quantity	14. Unit Wt/Vol	15. Waste No.
	No.	Type			
NON-RCRA REGULATED WASTE ONLY (CA REG) ( ) EMPTY AND/OR CRUSHED CONTAINERS	0.0.1	C.F	1800	P	State 512/513 EPA/Other CA REG
NON-RCRA REGULATED WASTE ONLY (CA REG) ( ) EMPTY AND/OR CRUSHED CONTAINERS	2121	D.M	275000	P	State 512/513 EPA/Other CA REG
c. ( ) ( )					State EPA/Other
d. ( ) ( )					State EPA/Other
J. Additional Descriptions for Materials Listed Above 1 X CY BOX W/ EMPTY CANS/DRUMS/CONTAINERS LAST CONTAINING PAINT AND P.O.L 1 X 85 DRUM WITH EMPTY P.O.L. (COMPRESSOR OIL) CONTAINERS			K. Handling Codes for Wastes Listed Above a. b. c. d.		

15. Special Handling Instructions and Additional Information  
KETTLEMAN HILLS Profile: LAX 623821  
D.O. 0024 JOB NO C-101-19  
GLOVES AND BOSSLES DISPOSAL BILLING: Environmental Dynamics  
EMERGENCY RESPONSE PHONE (213) 835-5181

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.  
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name NANCY VALES	Signature <i>Nancy Vales</i>	Month Day Year 10/13/91
-----------------------------------	---------------------------------	----------------------------

17. Transporter 1 Acknowledgement of Receipt of Materials		
Printed/Typed Name LORRA MORRIS	Signature <i>Lorra Morris</i>	Month Day Year 10/13/91

18. Transporter 2 Acknowledgement of Receipt of Materials		
Printed/Typed Name	Signature	Month Day Year

19. Discrepancy Indication Space		

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.		
Printed/Typed Name	Signature	Month Day Year

89915783

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7555

GENERATOR

TRANSPORTER

FACILITY

# AND DISPOSAL NOTIFICATION AND CERTIFICATION FORM

31 Tolo MCAS

Manifest Doc. No.:

115723

Number:

023821

State Manifest No.:

512/513

is submitted to Chemical Waste Management, Inc. in accordance with 40 CFR Part 268, which restricts the land disposal of hazardous wastes.

## NOTIFICATION OF THE WASTE

I have identified my waste and marked the appropriate box(es) below to indicate how my waste must be managed to conform to the land disposal restrictions.

A. Is this waste a non-wastewater or a wastewater? Check ONE: ☒ Non-Wastewater ☐ Wastewater

B. Identify ALL USEPA hazardous waste numbers that apply to this waste shipment (as defined by 40 CFR 261). For each waste number, identify the corresponding subcategory (check NONE or write in the description from 40 CFR 268.41, .42 or .43).

USEPA HAZARDOUS WASTE NO.	SUBCATEGORY
NONE	DESCRIPTION
	COILS AND REGULATOR
	WASTE ONLY

USEPA HAZARDOUS WASTE NO.	SUBCATEGORY
NONE	DESCRIPTION

To list additional USEPA waste number(s) and subcategory(s), use the supplemental sheet provided (CWM-2001-B). If the supplemental page is used, check here: ☐

## HOW MUST THE WASTE BE MANAGED?

Check the box(es) that indicate the Land Ban status of the waste. For any waste(s) that meets part of the treatment standard and requires additional treatment, you must mark (1) Box A (the waste requires treatment) and (2) Box B.1 or B.2 or D (the waste satisfies part of the treatment standards).

### A. RESTRICTED WASTE REQUIRES TREATMENT

I am the initial generator of a restricted waste (i.e., solvent/dioxin, California List, or scheduled waste) which must be treated to the applicable treatment standard set forth in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.42 or RCRA Section 3004(d) prior to land disposal. Requirements apply to EPA hazardous waste number(s).

1) OR the following California List constituent (check all that apply):

☐ Acid ☐ Metal ☐ Cyanides ☐ HOCs ☐ PCBs

Copy of all applicable treatment standards and specified treatment methods is maintained at the treatment, storage, and disposal facility named above.

### B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS

The EPA hazardous waste number(s) \_\_\_\_\_ has been treated in compliance with the applicable performance standards specified in 40 CFR Part 268 Subpart D. Supporting data is available to be provided as requested by the receiving facility.

I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that, based upon my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.42 or RCRA Section 3004(d) without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

### B.2 RESTRICTED WASTES FOR WHICH THE TREATMENT STANDARD IS EXPRESSED AS A SPECIFIED TECHNOLOGY (AND THE WASTE HAS BEEN TREATED BY THE SPECIFIED TECHNOLOGY)

I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.42. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment. This treatment has been performed for EPA hazardous waste number(s) \_\_\_\_\_

### C. RESTRICTED WASTE SUBJECT TO A VARIANCE

The waste identified above is subject to a national capacity variance, a traceability variance, or a case-by-case extension which expires on \_\_\_\_\_ This variance applies to EPA hazardous waste number(s) \_\_\_\_\_

If disposal occurs in a landfill or surface impoundment, the unit must meet the maximum technological requirements. (NOTE: Wastes destined for deepwell injection are subject to a separate set of variances. See instructions or 40 CFR Part 146.)

### D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT

I am the initial generator of the following EPA hazardous waste number(s) CA Reg  
I have determined that the waste meets all applicable treatment standards set forth in 40 CFR Part 268 Subpart D, and all applicable prohibitions set forth in Section 268.42 or RCRA Section 3004(d), and therefore, can be land disposed without further treatment. A copy of all applicable treatment standards and specified treatment methods is maintained at the treatment, storage and disposal facility named above.

I certify under penalty of law that I have personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste. I support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.42 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting false certification, including the possibility of a fine and imprisonment.

I hereby certify that all information submitted in this and all associated documents is complete and accurate, to the best of my knowledge and information.

Signature Allen J. Jones Title SPS Date 8-29-90

# California Land Disposal Restriction Notice and Certification

Name <u>EI TORO mcds</u>	Manifest Number <u>89915733</u>
California Hazardous Waste Code(s) <u>512/513</u>	CWM Profile Number <u>LAX-82322</u>

This form is submitted to Chemical Waste Management, Inc. in accordance with the requirements of CCR Title 22, Chapter 30, Article 40 which restricts the disposal of certain hazardous wastes. I have marked the appropriate box (boxes A. through D.) below to indicate how my waste must be managed to conform to the land disposal restrictions. A copy of all applicable treatment standards and waste analysis data, where available, is maintained at the Chemical Waste Management facility identified on the manifest referenced above. If the waste is not a RCRA regulated hazardous waste, I have also entered the appropriate California Waste Code and checked the appropriate box in the table below to indicate the applicable non-RCRA hazardous waste listing from 22 CCR Section 67702.

## Complete This Table For Non-RCRA, California Regulated Hazardous Wastes Only

Line Item	Check Here	Restricted Waste Description	Reference CCR Title 22
1	<input type="checkbox"/>	Metal-containing aqueous waste that contains any of the metals or metal compounds identified in 22 CCR 66699(b).	67702(b)(1)
2	<input type="checkbox"/>	Wastes containing polychlorinated biphenyls (PCBs).	67702(b)(2)
3	<input type="checkbox"/>	[reserved]	
4	<input type="checkbox"/>	[reserved]	
5	<input type="checkbox"/>	[reserved]	
6	<input type="checkbox"/>	[reserved]	
7	<input type="checkbox"/>	Metal-containing solid waste that contains any of the metals or metal compounds identified in 22 CCR 66699(b).	67702(b)(7)
	<input type="checkbox"/>	[reserved]	
	<input type="checkbox"/>	[reserved]	
10	<input type="checkbox"/>	Aqueous and liquid organic wastes that contain any organic compound measured by EPA Test Methods 8080, 8140, 8150, 8240, and 8270 described in <i>Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846</i> , Third Edition.	67702(b)(10)
11	<input type="checkbox"/>	Solid hazardous wastes that contain any organic compound measured by EPA Test Methods 8080, 8140, 8150, 8240, and 8270 described in <i>Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846</i> , Third Edition.	67702(b)(11)

### A. RESTRICTED WASTE REQUIRES TREATMENT

I am the generator of the waste identified above which must be treated to meet the applicable treatment standards set forth in CCR Title 22, Chapter 30, Article 41 prior to land disposal.

### B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS

"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that, based upon my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in CCR Title 22, Chapter 30, Article 41 without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

### C. RESTRICTED WASTE SUBJECT TO A VARIANCE

The waste identified above is subject to a capacity variance which expires on \_\_\_\_\_.

### D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT

"I certify under penalty of law that I have personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in CCR Title 22, Chapter 30, Article 41 without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

I certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and opinion.		
Signature <u>Stanley Gates</u>	Title <u>EPS</u>	Date <u>8-29-90</u>

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address EL MARINE COFFS AIR STATION (UGI) BUILDING 240 ENVIRONMENTAL DEPARTMENT EL MARINE CA 95940-5001		4. Generator's Phone ( )		A. State Manifest Document Number <b>89915782</b>	
5. Transporter 1 Company Name		6. US EPA ID Number		B. State Generator's ID	
7. Transporter 2 Company Name		8. US EPA ID Number		C. State Transporter's ID <b>107565</b>	
9. Designated Facility Name and Site Address PACIFIC TREATMENT CORP. 10000 10TH AVE EL MARINE CA 95940-5001		10. US EPA ID Number		D. Transporter's Phone E. State Transporter's ID F. Transporter's Phone G. State Facility's ID <b>110075014556</b> H. Facility's Phone	
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No.	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. <b>1 X 30 GAL DRUM OF CLEVER ELECTROLYTE W/ SULFURIC ACID AND WATER</b>					State <b>CA</b> EPA/Other <b>2</b>
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other
J. Additional Descriptions for Materials Listed Above		K. Handling Codes for Wastes Listed Above			
1 X 30 GAL DRUM OF CLEVER ELECTROLYTE W/ SULFURIC ACID AND WATER		a. <b>145TB</b>		b. c. d.	
15. Special Handling Instructions and Additional Information PACIFIC Profiles: <b>ALT 100F 65% CERN 780000545770 12000 241-1007</b> C.A. 95940 JOB NO. 0-141-10 <b>EMERGENCY RESPONSE PHONE (209) 520 8158</b> WASTES ARE STORED IN SPECIAL BULKLINE Environmental Services					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name <b>NANCY VATES</b>		Signature <i>Nancy Vates</i>		Month Day Year <b>10 8 2 1990</b>	
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature <i>Lonnie Norris</i>		Month Day Year <b>08 21 1990</b>	
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.					
Printed/Typed Name <b>Thane Adams</b>		Signature <i>Thane Adams</i>		Month Day Year <b>11 11 1990</b>	

FACILITY ONE  
2700 Main Street  
San Diego, CA 92113  
(619) 233-0171



## Pacific Treatment Corporation

P.O. Box 13626, San Diego, CA 92113

FACILITY TWO  
1000 H Street, Apt. 100  
San Diego, CA 92113  
(619) 233-0171

### RCRA LAND DISPOSAL RESTRICTION NOTIFICATION

Generator Name: ST. LOUIS MOBILE

EPA ID Number: CAD9325-3627

Manifest Number: 89915738

Date of Shipment: 3/29/90

EPA Hazardous Waste Number: D002

This notification is hereby submitted to Pacific Treatment Corporation in compliance with EPA regulations described in 40 CFR Part 268 which prohibit the land disposal of certain hazardous wastes, unless those wastes are treated to meet specified standards or treated using specified treatment technologies.

I have determined that the described on the above listed manifest is restricted in its present form and must be treated prior to land disposal.

#### WASTE (check one)

- ☐ Liquid hazardous waste including free liquids associated with any solid or sludge containing free cyanides at concentrations greater than or equal to 1000 mg/L
- ☐ Liquid hazardous wastes, including free liquids associated with any solid or sludge, containing the following metals (or elements) at concentrations greater than or equal to those specified below:  
(check those that apply)
  - ☐ Arsenic and/or compounds (as As) 500 mg/L;
  - ☐ Cadmium and/or compounds (as Cd) 100 mg/L;
  - ☐ Chromium (VI) and/or compounds (as Cr VI) 500 mg/L;
  - ☐ Lead and/or compounds (as Pb) 500 mg/L;
  - ☐ Mercury and/or compounds (as Hg) 20 mg/L;
  - ☐ Nickel and/or compounds (as Ni) 134 mg/L;
  - ☐ Selenium and/or compounds (as Se) 100 mg/L; and
  - ☐ Thallium and/or compounds (as Tl) 130 mg/L;
- ☐ Liquid hazardous wastes that are primarily water and contain halogenated organic compounds (HOCs) in total concentration greater than or equal to 1,000 mg/L and less than 10,000 mg/L HOCs (see attached listing of HOC constituents)
- ☒ Liquid hazardous wastes containing polychlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm
- ☒ Liquid hazardous wastes having a pH less than or equal to two (2)
- ☐ The spent solvent wastes specified in 40 CFR 261.31 as EPA Hazardous Wastes Nos. F001, F002, F003, F004, and F005

#### TREATMENT STANDARD

Cyanide Destruction  
Stabilization

Metals Recovery  
Stabilization

Carbon Absorption  
Steam Stripping  
Other

Incineration, high efficiency  
boiler, other thermal treatment

Neutralization  
Stabilization

Specify technology used to meet Table CCWE \_\_\_\_\_  
Check constituent(s) on Table CCWE which were  
reduced below treatment standards

The most recent copy of waste analysis or a description of the knowledge upon which this notification is based is attached.

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Henry J. Lee  
Signature

SPS  
Title

8-29-90  
Date

714-726-6606  
Telephone Number

Table CCWE  
Constituent Concentration in Waste Extract  
40 CFR 268.41(a)

FOU1 - F005 spent solvents	Concentration (in mg/l)	
	Wastewaters containing spent solvents	All other spent solvent wastes
11 Acetone	0.05	0.59
11 n-Butyl alcohol	5.0	5.0
11 Carbon disulfide	1.05	4.81
11 Carbon tetrachloride	.05	.96
11 Chlorobenzene	.15	.05
11 Cresols (and cresylic acid)	2.82	.75
11 Cyclohexanone	.125	.75
11 1,2-Dichlorobenzene	.65	1.25
11 Ethyl acetate	.05	.75
11 Ethylbenzene	.05	.053
11 Ethyl ether	.05	.75
11 Isobutanol	5.0	5.0
11 Methanol	.25	.75
11 Methylene chloride	.20	.96
11 Methylene chloride (from the pharmaceutical industry)	12.7	.96
11 Methyl ethyl ketone	0.05	0.75
11 Methyl isobutyl ketone	0.05	0.33
11 Nitrobenzene	0.66	0.125
11 Pyridine	1.12	0.33
11 Trichloroethylene	0.079	0.05
11 Toluene	1.12	0.33
11 1,1,2-Trichloro-1,2,2-hexafluoroethane	1.05	0.96
11 1,1,1-Trichloroethane	1.05	0.41
11 Trichloroethylene	0.062	0.091
11 Trichlorofluoromethane	0.05	0.96
11 Xylene	0.05	0.15

C101-17

**UNIFORM HAZARDOUS  
WASTE MANIFEST**

1. Generator's US EPA ID No. **CA6170023208EVD1D**  
Manifest Document No.

2. Page 1 of 1  
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address  
**EITORS MINIPINE Corps Air Station (IUG)  
Building 368 ENVIRONMENTAL Dept, EITORS, CA**  
4. Generator's Phone (714) 726-6606 (714) 724-2165 '92701

A. State Manifest Document Number  
**90179737**

B. State Generator's ID  
**HYHQ36-0209812**

5. Transporter 1 Company Name  
**ENVIRONMENTAL Dynamics**  
6. US EPA ID Number  
**CAD732513699**

C. State Transporter's ID  
**101-63**

D. Transporter's Phone  
**(213) 521-3155**

7. Transporter 2 Company Name  
8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address  
**OMEGA RECOVERY SERVICES  
12504 EAST WHITTIER BLVD  
WHITTIER CA 90602**  
10. US EPA ID Number  
**CAD042245001**

G. State Facility's ID  
**CAD042245001**

H. Facility's Phone  
**(213) 698-0991**

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	13. Total Quantity	14. Unit Wt/Vol	15. Waste No.
a. <b>WASTE PAINT RELATED MATERIAL (D001) RQ Flammable liquid <del>NA</del> NA1263</b>	<b>1</b>	<b>1</b>	<b>DM</b>	<b>214 EPA/Other D001</b>
b. <b>WASTE 1,1,1-TRICHLOROETHANE (F002) RQ ORM-A UN 2831</b>	<b>1</b>	<b>1</b>	<b>DM</b>	<b>211 EPA/Other F002</b>
c.				
d.				

J. Additional Descriptions for Materials Listed Above  
**A) MIXED THINNERS, Petroleum Distillates, Acetone,  
Paint, Paint Stripper, MEK, Toluene, Xylenes  
OFF SPEC / Virgin Consolidated Products**

K. Handling Codes for Wastes Listed Above  
a. **01** b. **01**  
c. d.

15. Special Handling Instructions and Additional Information  
**B) Consolidated 1,1,1-Tric solvent OMEGA PROFILE 1465F, 1465B  
Gloves & Goggles / Contract NO2174-37-2132 option 2 Give 3.15/323/3.71/3.71**

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.  
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name **Nancy Vate** Signature **Nancy Vate** Month Day Year **11/11/92**

17. Transporter 1/Acknowledgement of Receipt of Materials  
Printed/Typed Name **HECTOR L. MARTINEZ** Signature **Hector L. Martinez** Month Day Year **11/11/92**

18. Transporter 2/Acknowledgement of Receipt of Materials  
Printed/Typed Name Signature Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.  
Printed/Typed Name **HECTOR ALVARADO** Signature **Hector A. Alvarado** Month Day Year **11/11/92**

90179737

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL HAZARDOUS WASTE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

GENERATOR

TRANSPORTER

FACILITY



IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL  
TOXIC CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

GENERATOR

TRANSPORTER

FACILITY

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 5	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address El Toro/ MCAS HHS-368, Santa Ana, CA 92709		4. Generator's Phone (714) 726-2221		A. State Manifest Document Number 90284725	
5. Transporter 1 Company Name Northwest EnviroService, Inc.		6. US EPA ID Number IWA D058367152		C. State Transporter's ID 100685	
7. Transporter 2 Company Name		8. US EPA ID Number		D. Transporter's Phone (206) 622-1090	
9. Designated Facility Name and Site Address Northwest EnviroService, Inc. 1500 Airport Way South Seattle, WA 98134		10. US EPA ID Number IWA D058367152		E. State Transporter's ID F. Transporter's Phone G. State Facility's ID H. Facility's Phone Emergency Contact (206) 622-1090	
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. RQ Waste sodium hydroxide, solution. Corrosive material, UN1824. (D002)		1	DM	55	G
b. RQ Waste battery, electric storage, dry. Corrosive material, NA1813. (D008)		1	DM	40	P
c. Non RCRA Hazardous Waste Solid.		1	DM	1605	P
d. RQ Waste Paint. Flammable Liquid, UN1263 (D001)		1	DM	1515	P
J. Additional Descriptions for Materials Listed Above		K. Handling Codes for Wastes Listed Above			
a) NFO 26050 - CLIN - 1660 SODIUM HYDROXIDE SOLUTION - HWP-D (1)		a) SOIC, T31T, T23T			
b) NFO 22616 CLIN 0508 - Lead Acid Battery Dry - ED (3)		b) SOIC, T28C			
c) NFO 19807 - CLIN 1203 - EMPTY CONTAINERS - HMT (4,7,48,49)		c) SOIC, T29T, T23T			
d) NFO 25132 - CLIN 4733 - PAINT W/SOLVENTS - F-GR. SYSTEC (5,12)		d) SOIC, S02T, T50T			
15. Special Handling Instructions and Additional Information					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name DANIELAS CHILDEMS		Signature [Signature]		Month Day Year 09/11/90	
17. Transporter 1 Acknowledgement of Receipt of Materials					
Printed/Typed Name BRUCE D. WEYERMANN		Signature [Signature]		Month Day Year 09/11/90	
18. Transporter 2 Acknowledgement of Receipt of Materials					
Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.					
Printed/Typed Name Ronald J. Brown		Signature [Signature]		Month Day Year 09/13/90	

**UNIFORM HAZARDOUS  
WASTE MANIFEST**

1. Generator's US EPA ID No.

Manifest  
Document No.

2. Page 1  
of 1

Information in the shaded areas  
is not required by Federal law

3. Generator's Name and Mailing Address

EL TORO / MCAS FMD  
BLDG. 368, Santa Ana, CA 92709  
714 726-2221

A. State Manifest Document Number

90284656

B. State Generator's ID

5. Transporter 1 Company Name

Northwest EnviroService, Inc.

6. US EPA ID Number

WA D 0 5 8 3 6 7 1 5 2

C. State Transporter's ID

D. Transporter's Phone

(206) 622-1090

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Northwest EnviroService, Inc.  
1500 Airport Way South  
Seattle, WA 98134

10. US EPA ID Number

WA D 0 5 8 3 6 7 1 5 2

G. State Facility's ID

H. Facility's Phone

EMERGENCY CONTACT  
(206) 622-1090

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

a. X Hazardous waste solid, n.o.s. (cadmium, lead).  
ORM-E, NA9189.

12. Containers  
No. Type

12 DIM

13. Total  
Quantity

1520 P

14. Unit  
Wt/Vol

P

I. Waste No.

State  
WFO2-181 D006  
EPA/Other  
D006 D007

EPA/Other

State

EPA/Other

State

EPA/Other

J. Additional Descriptions for Materials Listed Above

a) WFO 26520 - CLIN 2004 - UNKNOWN CRYSTALS - D-SER, (M)  
(62)

K. Handling Codes for Wastes Listed Above

a. ASOIL, TAIL  
c. d.

15. Special Handling Instructions and Additional Information

18.

**GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

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Printed/Typed Name

Signature

Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

Transporter 1 date should be 10/11/90

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Signature

Month Day Year

Kimberly J. Boon

[Signature]

11/01/2190

Do Not Write Below This Line

Please print or type. (Form designed for use on elite (12-pitch typewriter).)

89626595  
NSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-75

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL  
TRANSPORTER

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
3. Generator's Name and Mailing Address MCAS EL TORO (CODE LJC) SANTA ANA, CA 92709		EMERG# 801-399-7327		A. State Manifest Document Number 89626595	
4. Generator's Phone ( 714 726-2821				B. State Generator's ID H Y H Q 3 6 1 - 0 2 0 9 8 2	
5. Transporter 1 Company Name ASBURY OIL CO.	6. US EPA ID Number C A D 0 2 8 2 7 7 0 3 6	C. State Transporter's ID 108623-108623		D. Transporter's Phone (213) 321-1192	
7. Transporter 2 Company Name	8. US EPA ID Number	E. State Transporter's ID		F. Transporter's Phone	
9. Designated Facility Name and Site Address DEMENTIO-KERDOON 2000 N. ALAMEDA ST. COMPTON, CA 90222	10. US EPA ID Number C A T 0 8 0 0 1 3 3 5 2	G. State Facility's ID H Y H Q 3 6 1 - 0 2 0 9 8 2		H. Facility's Phone (213) 537-7100	
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No. Type	13. Total Quantity	14. Unit Wt/Vol	1. Waste No.
a. WASTE PETROLEUM OIL, n.o.s. COMBUSTIBLE LIQUID NA 1270		0 0 2 I T	0.7467	G	State 221 EPA/Other P001
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other
J. Additional Descriptions for Materials Listed Above WASTE OIL, HYDRAULIC FLUID, JP-5		K. Handling Codes for Wastes Listed Above a. 01 b. c. d.			
15. Special Handling Instructions and Additional Information RUBBER GLOVES					
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name E. BENAVENTE		Signature <i>E. BENAVENTE</i>		Month Day Year 11/2/79	
17. Transporter 1 Acknowledgement of Receipt of Materials					
Printed/Typed Name KENNETH L. JORDAN		Signature <i>Kenneth L. Jordan</i>		Month Day Year 11/2/79	
18. Transporter 2 Acknowledgement of Receipt of Materials					
Printed/Typed Name		Signature		Month Day Year	
19. Discrepancy Indication Space					
20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.					
Printed/Typed Name J R HARRIS		Signature <i>J R HARRIS</i>		Month Day Year 11/2/79	

**UNIFORM HAZARDOUS  
WASTE MANIFEST**

1. Generator's US EPA ID No.

C A 6 1 7 0 0 2 3 2 0 8 0 2 8 4 C

Manifest  
Document No.

2. Page 1  
of 1

Information in the shaded areas  
is not required by Federal law.

3. Generator's Name and Mailing Address

El Toro/ MCAS  
BLDG. 368, Santa Ana, CA 92709

4. Generator's Phone (714) 726-2221

5. Transporter 1 Company Name

Northwest EnviroService, Inc.

8. US EPA ID Number

W A D 0 5 8 3 6 7 1 5 2

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address

Northwest EnviroService, Inc.  
1500 Airport Way South  
Seattle, WA 98134

10. US EPA ID Number

W A D 0 5 8 3 6 7 1 5 2

A. State Manifest Document Number

90284679

B. State Generator's ID

C. State Transporter's ID

D. Transporter's Phone (206) 622-1090

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone (206) 622-1090  
Emergency Contact

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

a. Waste Battery, electric storage, dry.  
Corrosive material, NA1813. (D008)

12. Containers  
No. Type

2 C F

13. Total  
Quantity

4 0 0 0

14. Unit  
Wt/Vol

P

1. Waste No.

State D002 D008 181

EPA/Other  
W102

State

EPA/Other

State

EPA/Other

State

EPA/Other

J. Additional Descriptions for Materials Listed Above

a) WPQ 22616 - CLIN 0508 - LEAD ACID BATTERY DRY - HD (2)

K. Handling Codes for Wastes Listed Above

a. 2) SOLID, T38C

c.

d.

15. Special Handling Instructions and Additional Information

18.

**GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

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Printed/Typed Name

Donald J. Boquist

Signature

[Signature]

Month Day Year

10/11/90

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

GARY TUGGLE

Signature

[Signature]

Month Day Year

09/11/90

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Ronald J Boquist

Signature

[Signature]

Month Day Year

10/13/90

YU284679  
GENERAL INFORMATION  
NCE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL  
TRANSPORTER

FACTOR

# APPENDIX E

## STORAGE BUILDING T673

Project No. 01-F138-ZX  
June 9, 1992

This investigation is to review and certify the adequacy of the Storage Building (T673), located at the U.S. Marine Corps Air Station in El Toro, California, to resist the lateral forces induced by wind or earthquake. The intended use of this building is the storage of hazardous waste.

Jacobs Engineering Group has reviewed the building and a summary of the conclusions is noted below. The building was built in 1942 and no design calculations or detail drawings exist. The investigation was based on field observations and measurements. A number of assumptions had to be made, as shown in the calculations, in order to proceed with the review. The structure has not been reviewed for gravity loads.

Due to the lack of any geotechnical or other similar reports regarding the ground acceleration and related data at the jobsite, it was not feasible to investigate the response of the structure to a Maximum Credible Earthquake. Therefore, the review was based on the current adopted edition of the Uniform Building Code (1988 UBC).

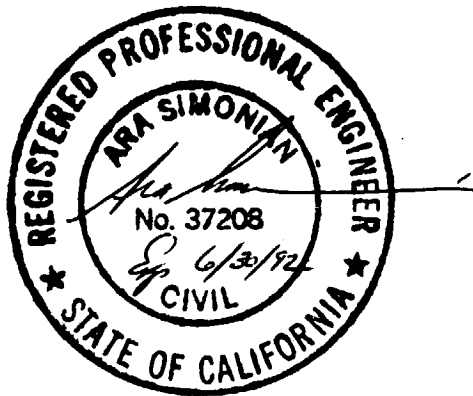
Jacobs Engineering Group certifies, based on the available data, that Building T673 is in poor condition to resist any lateral forces. The structure needs to be strengthened as follows:

- 1) To transfer lateral forces from the roof to the foundation, a number of braces need to be added at the following locations:
  - a) Roof: Diagonal braces to tie all the frames together and provide a reliable system to transfer the lateral loads into the frames.
  - b) Roof: Continuity beams throughout the length of the structure to tie the resisting members together and provide a good distribution of the forces (the existing roof deck cannot be used for this purpose).
  - c) Exterior walls: Tie rod or structural angle cross braces are required to transfer the forces from roof to foundation (the siding is not adequate). Longitudinally, a minimum of three bays are needed, and transversely, both end walls have to be braced.
  - d) Interior frames: Tie rod cross braces are required inside the structure. They may be located at the location of the curbs to have minimal interference with the intended use of the structure.

- 2) Column and beam members, which consist of cold formed parts, have to be analyzed in detail and the parts properly connected to each other so they work as one section and get the most out of the existing members.
- 3) Connection of the columns to the base plate and the foundation have to be strengthened by adding concrete anchors and/or thickening the base plate.
- 4) To check the adequacy of the foundation, additional information will be required, i.e. the sizes of the foundations and the allowable soil bearing pressure.

Sketches of the required upgrade are shown on calculation sheets 9, 10 and 11.

The above is based on preliminary analysis. Jacobs Engineering feels that a more detailed analysis is required to bring the structure up to the current code requirements.





DATE \_\_\_\_\_

SUBJECT

SHEET NO. \_\_\_\_\_

BY \_\_\_\_\_ CHKD. \_\_\_\_\_

JOB NO. \_\_\_\_\_

U.S. MARINE CORPS  
AIR STATION

EL TORO

BUILDING T673



DATE 5/30/92

SUBJECT

NAVY / EL TOROSHEET NO. (2)BY AS CHKD. \_\_\_\_\_BLDG T673JOB NO. 01-F138-EXOBJECTIVE

Review the lateral stability of building T673 in EL TORO Air Station.

The building is a very old pre-engineered steel framed structure. No drawings and information are available.

CRITERIA

UBC 1988.

(Note:  $\frac{1}{3}$  increase for lateral is not considered in this review)

Structural steel:  $F_y = 25 \text{ ksi}$  (cold-formed steel)

Note: the following analysis is approximate and is intended to reveal the weaknesses of the structure only. For the purpose of construction drawings, a more accurate and detailed analysis is required.

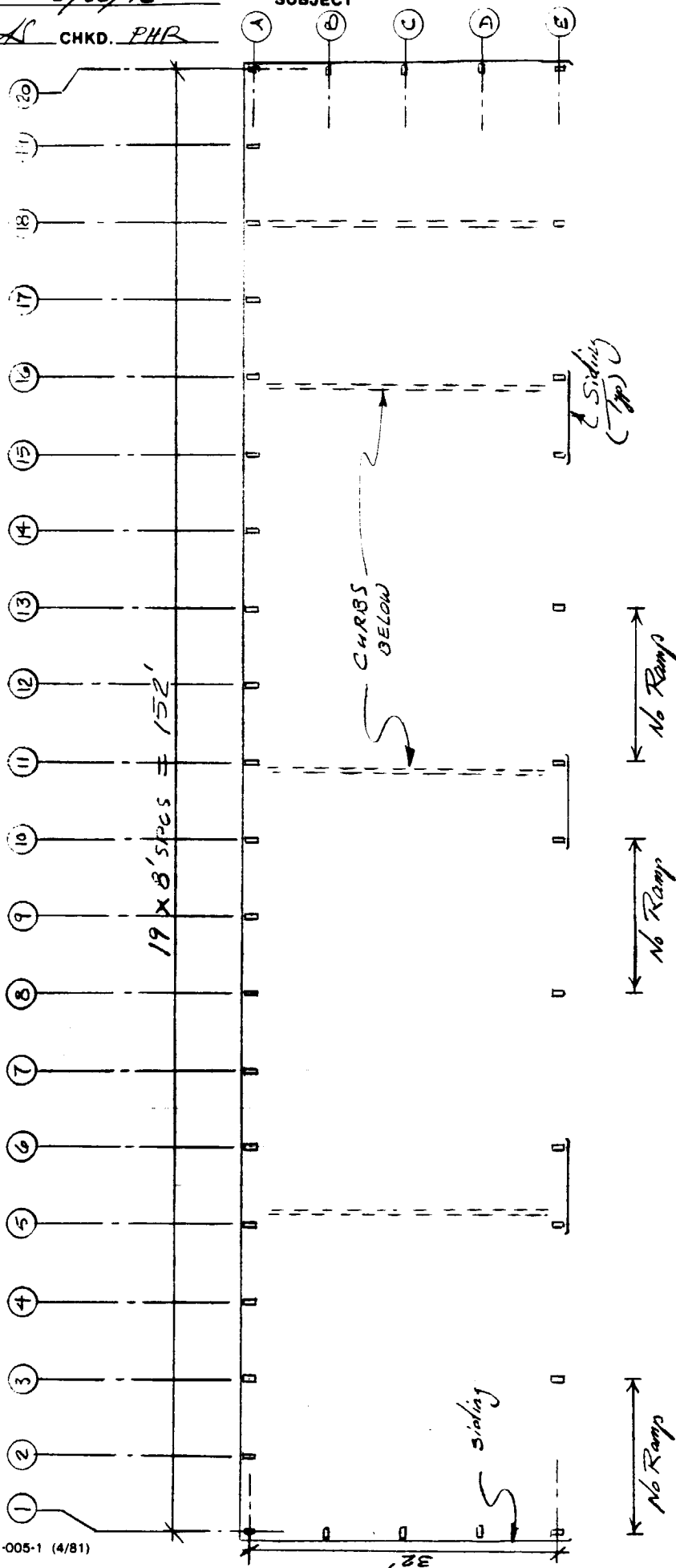
NAVY/EL TORO  
BLDG T673

DATE 5/30/92

BY AL CHKD. PHR

**SUBJECT**SHEET NO. 1

JOB NO. 01-15138-ZX



PLANT

DATE 5/30/92SUBJECT NAVY / EL TOROSHEET NO. 2BY AS CHKD. PHRBLDG T673JOB NO. 01-F/38-ZXLATERAL ANALYSIS

a) Seismic

$$V = \frac{ZIC}{R_w} W_{DL}$$

$$= \frac{0.4(1.25)2.75}{8} W_{DL} = 0.172 W_{DL}$$

for braced  
frames  $R_w = 8$

$$W_{DL} = (10 \text{ PSF})(13' + 16.76' \times 2 + 4' \text{ open side}) \times 152'$$

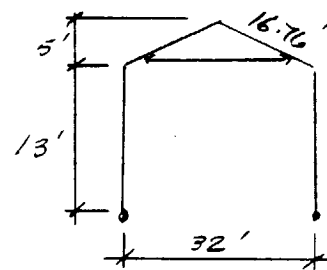
$$+ (10 \text{ PSF})(13 \times 32 + \frac{5 \times 32}{2}) \times 2$$

$$= 76.8 \text{ K} + 5.76 \text{ K}$$

$$= 82.6 \text{ K}$$

$$\therefore V_{BLDG} = 0.172(82.6)$$

$$= 14.2 \text{ K}$$



b) Wind

$$V_{TRANS} = p(18' \times 152')$$

$$= C_e C_g q I(18' \times 152')$$

$$= \underbrace{(1.2)(1.3)(13)(1)}_{20.28}(18' \times 152')$$

$$= 55.5 \text{ K}$$

$$> 14.2 \text{ K}$$

$$V_{LONG.} = 20.28(13 \times 32 + \frac{5 \times 32}{2})$$

$$= 10.06 \text{ K}$$

$$< 14.2 \text{ K}$$

$\therefore$  Seismic controls  
longitudinally  
& Wind controls  
Transversely

DATE 5/30/92SUBJECT NAVY / EL TOROSHEET NO. 3BY AS CHKD. PHRPLDG TG73JOB NO. 01-F138-EX- Seismic in Longitudinal direction

$$\text{total } V = 14.2 \text{ k}$$

$$V @ \text{ upper half} = \overbrace{\left( \frac{13' + 5'}{2} \right) / 18'}^{\text{TRIB.}} \times 14.2 = 9.1 \text{ k}$$

$$\therefore V \text{ ea. side} = \frac{9.1}{2} = 4.6 \text{ k}$$

$$F_{\text{brace}} = 4.6 \times 1.414 = 6.4 \text{ k}$$

T = 2 C

try L4X3X5/16 @ 200

$$\frac{f}{r} = \frac{11.3 \times 12}{0.647} = 210$$

$$\therefore F_A = \frac{12 \pi^2 29 \times 10^3}{23 (210)^2} = 3.4 \text{ ksi}$$

$$\therefore P_a = 3.4 \times 2.09 = 7.1 \text{ k} > 6.4$$

OK

$$\text{No. of } 5/8 \text{ bolts} = \frac{6.4}{3.1} = 2.06$$

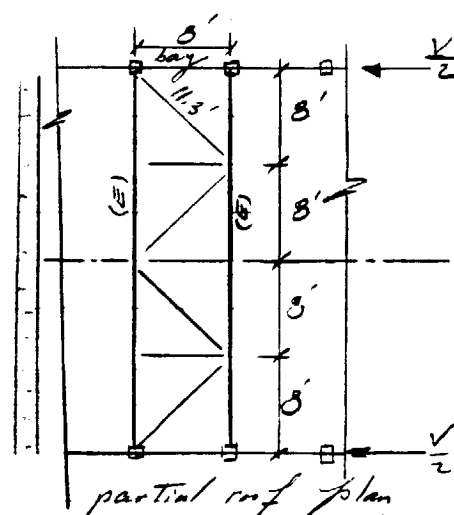
try 1/2" tension rods @ sides

$$F_{\text{rod}} = 4.6 \times \frac{15.26}{8} = 8.8 \text{ k}$$

$$F_{1/2"} = 19.1 \text{ ksi} \times 0.142 = 2.7 \text{ k}$$

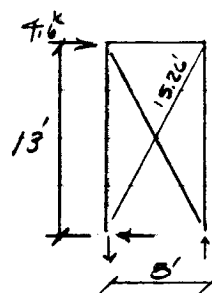
$$\begin{aligned} \text{min. no. of bays to be braced} &= \\ &= \frac{8.8}{2.7} = 3.2 \end{aligned}$$

say 3



$\therefore$  use L4X3X5/16  
w/ 2 - 3/4" BOLT

2 ples. min.

 $\therefore$  X-BRACE 3 BAYS

w/ 5/8" TIE RODS  
(A36)

DATE 6/1/92

SUBJECT

NAVY / EL TERO

SHEET NO. 4BY AS CHKD. PHR

BLDG T673

JOB NO. 01-F138-ZX

maybe ignored

$$\begin{aligned}
 \text{Column reaction} &= \frac{4.6^k}{3} \times \frac{13'}{8'} + \frac{\overset{LL}{16} + \overset{DL}{10}}{1000} \times \frac{\overset{TRIB.}{16+8}}{2} \times \frac{32'}{2} \\
 &= 2.5 + 5 \\
 &= 7.5 \text{ k}
 \end{aligned}$$

$$\frac{l}{r} = \frac{13' \times 12}{2.77} = 56.3$$

assuming  $F_y = 25 \text{ ksi}$  (cold formed steel)

$$\therefore F_a = 12.4 \text{ ksi}$$

$$\begin{aligned}
 \therefore T_a &= 12.4 \times 3.2 \text{ } \leftarrow \text{cross sectional area (approx.)} \\
 &= 102 \text{ Kips} \gg 7.5
 \end{aligned}$$

OKCol. Sec.

is OK, but

parts need  
Tied together

- Anchor bolts

$$T = 2.5^k \div 2 \text{ anchors} = 1.25^k$$

$$V = 4.6 \div 2 \text{ anchors} = 2.3 \text{ k}$$

$$\begin{aligned}
 \text{try } 3/4" \phi \text{ Redhead wedge anchors (10" embed.)} \\
 \left. \begin{aligned} T_a &= 2.45 \\ V_a &= 4.09 \end{aligned} \right\} \text{ w/ Insp. } \left\{ \begin{aligned} \text{assume } f'_c &= 2500 \end{aligned} \right.
 \end{aligned}$$

$$\therefore \frac{1.25}{2.45} + \frac{2.3}{4.09} = 1.036 \approx 1$$

say OK $\therefore$  add 2-3/4"  $\phi$  Wedge anch.

- Foundation

(not checked due to lack of information about foundation &amp; soil properties).

DATE 5/30/92

SUBJECT

NAVY / EL TOROSHEET NO. 5BY AK CHKD. PHRBLDG 7673JOB NO. 01-F138-EX- Wind in transverse direction

$$\text{total } V = 55.5 \text{ k}$$

$$V @ \text{ upper half} = 0.64 \times 55.5 = 35.5 \text{ k}$$

$$\therefore V @ \text{ ea. side} = \frac{35.5}{2} = 17.7$$

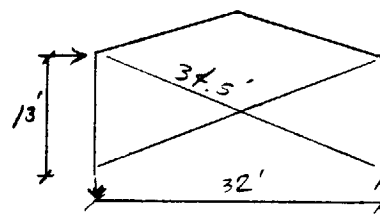
too high  
 $\therefore$  add more braced  
 frames

try 3 interior frames

$$\therefore V \text{ per frame} = \frac{35.5}{4} = 8.9 \text{ k}$$

$$F_{\text{rod}} = 10 \times \frac{34.5'}{32} = 10.8 \text{ k}$$

7/8" A36  
TIE RODS

@ 3 INTERIOR FRAMES- exterior end frames

$$V = \frac{35.5 \text{ k}}{15.2'} \times \frac{32'}{2} = 3.7 \text{ k}$$

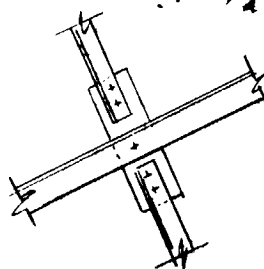
try  $L3 \times 3 \times 1/4$ 

$$L_u = 34.5' / 4 = 8.6'$$

$$C_r = \frac{8.6}{0.592} \times 12 = 175 \quad \therefore F_a = 4.33 \text{ ksi}$$

$$\therefore P_a = 4.33 \times 1.44 = 7.0 \text{ k}$$

$$\text{Reaction} = \frac{4.3 \times 13}{32} = 1.8 \text{ k}$$



$$> 4 \times \frac{34.5}{32} = 4.3 \text{ k}$$

ok

$L3 \times 3 \times 1/4$  X.R.R.  
@ END FRAMES

DATE 6/2/92  
BY AS CHKD. PHRSUBJECT NAVY / EL TORO  
Bldg T673SHEET NO. 6  
JOB NO. 01-F138-ZX

$$\begin{aligned}
 \text{Column reactions} &= \frac{10.5 \times 13}{32} + \frac{(16+10)}{1000} \times 8' \times \frac{32}{2} \\
 &= 4.4 + 3.3 \\
 &= 7.7 \text{ K}
 \end{aligned}$$

$< 102 \text{ K}$  (see stat 4)  
OK

$$V = 10 \div 4 \text{ anchors} = 2.5 \text{ K}$$

$$T = 4.4 \div 4 \text{ anchors} = 1.1 \text{ K}$$

try  $3/4"$   $\phi$  Redhead wedge anchors (10" embed)

$$\begin{aligned}
 T_a &= 2.45 \\
 V_a &= 4.09
 \end{aligned}
 \left. \begin{array}{l} \\ \end{array} \right\} \text{w/ Inspa}$$

$$\frac{2.5}{4.09} + \frac{1.1}{2.45} = 1.06 \approx 1$$

say OK

0.85 K  
if consider 80% DL only  $\therefore$  stress ratio = 0.96  
 $< 1.0$   
OK

$\therefore$  add 4- $3/4"$   $\phi$   
wedge anchors

- Foundation

(not checked due to lack of information about foundation & soil properties)

DATE 6/8/92

SUBJECT

NAVY / 62 TORO

SHEET NO.

7

BY

AS

CHKD.

PHRPLDG T673

JOB NO.

01-F738-EX

- roof truss in transverse direction

$$w = \frac{55500}{152'} = 365 \text{ lb/ft}$$

longest truss span is btwn grid 5 &amp; 11 = 48'

$$\text{reaction @ each end} = \frac{365 \times 48}{2} = 8.76 \text{ k}$$

$$\therefore F \text{ in brace} = 8.76 \times 1.414 \\ = 12.4 \text{ k}$$

try  $L 4 \times 4 \times 5/16$ 

$$\frac{L}{r} = \frac{11.3 \times 12}{0.791} = 171$$

$$\therefore F_a = 5.11 \text{ ksi}$$

$$P_a = 5.11 \times 2.4 = 12.3 \text{ k} \approx 12.4 \text{ k}$$

$$\therefore \text{use } L 4 \times 4 \times 5/16 \\ w/ 2 - 3/4" \times 9 \\ \underline{A325N}$$



DATE 6-3-92

SUBJECT

NAVY / EL TORO

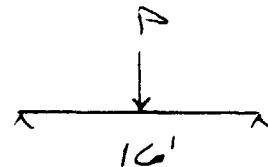
SHEET NO.

8BY AS CHKD. PHRBLDG T673JOB NO. 01-F138-EXDesign of Beams @ Door Openings

$$W_{RF} = (\overset{DL}{10} + \overset{LL}{20}) \times 8' = 240 \text{ #/}$$

$$\therefore P = 240 \times \frac{32'}{2} = 3.84 \text{ K}$$

$$M = \frac{3.84 \times 16'}{4} = 15.4 \text{ K}$$



Try W6X15

$$\frac{P}{F_t} = \frac{10 \times 12}{1.61} = 119$$

$$F_b = 21.6 \text{ Ksi}$$

$$f_b = \frac{15.4 \times 12}{9.72} = 19.0 < 21.6$$

OK∴ use W6X15



DATE 6/4/92

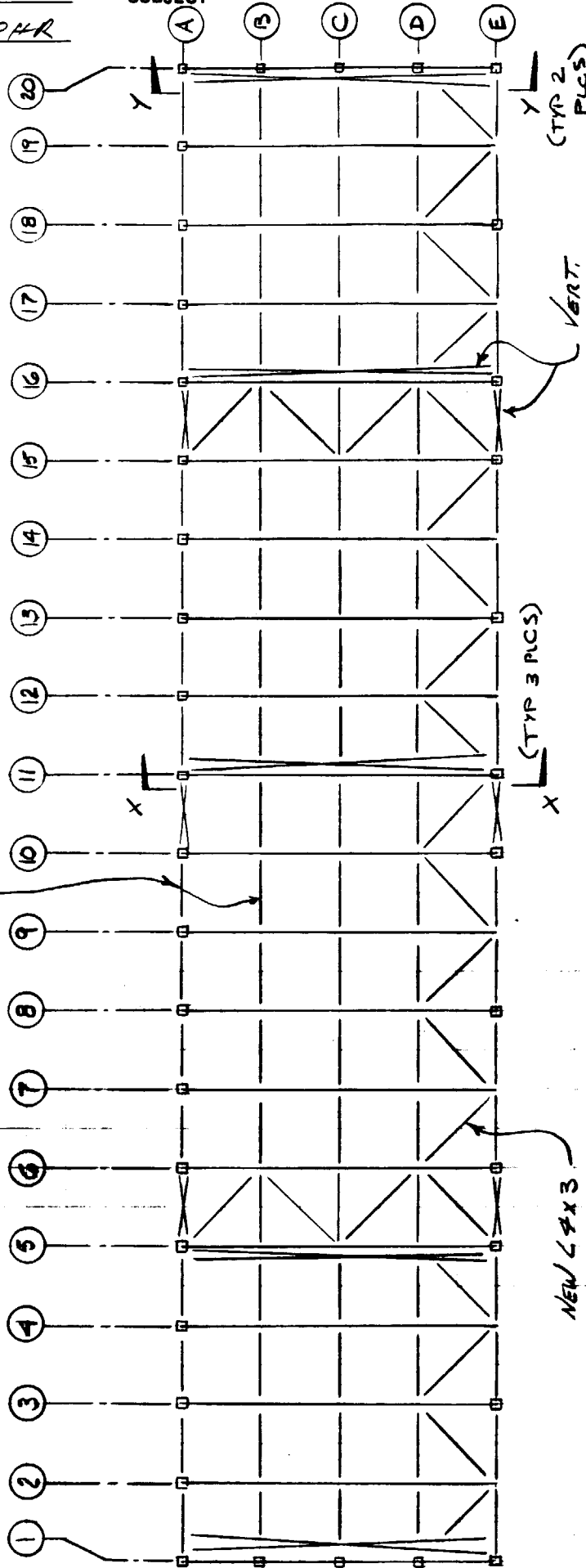
BY AS CHKD. PHR

SUBJECT

SHEET NO. 9

JOB NO. 01-F138-ZX

NEW CONTINUITY BEAMS  
CLL  
(TYP)



(TYP 3 PLCS)

(TYP 2 PLCS)

ROOF FRAMING PLAN

NEW L4x3  
BRACING  
(TYP AS SHOWN)



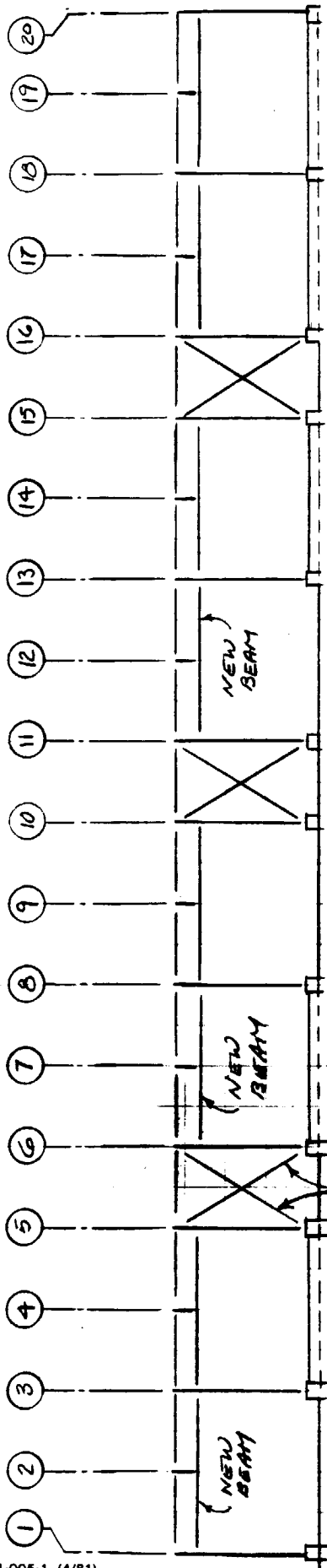
DATE 6/5/92

SUBJECT NAVY / EL TORO  
BLDG T673

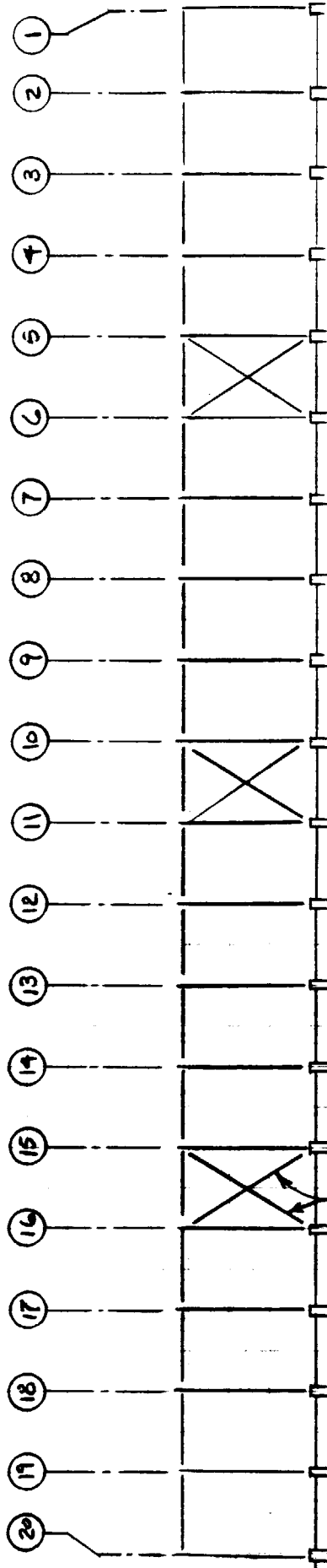
SHEET NO. 10

BY AS CHKD. PHR

JOB NO. 01-1-138-ZX



ELEVATION AT LINE E



ELEVATION AT LINE A



DATE

6/8/92

SUBJECT

NAVY / EL TORO  
BLDG T673

SHEET NO.

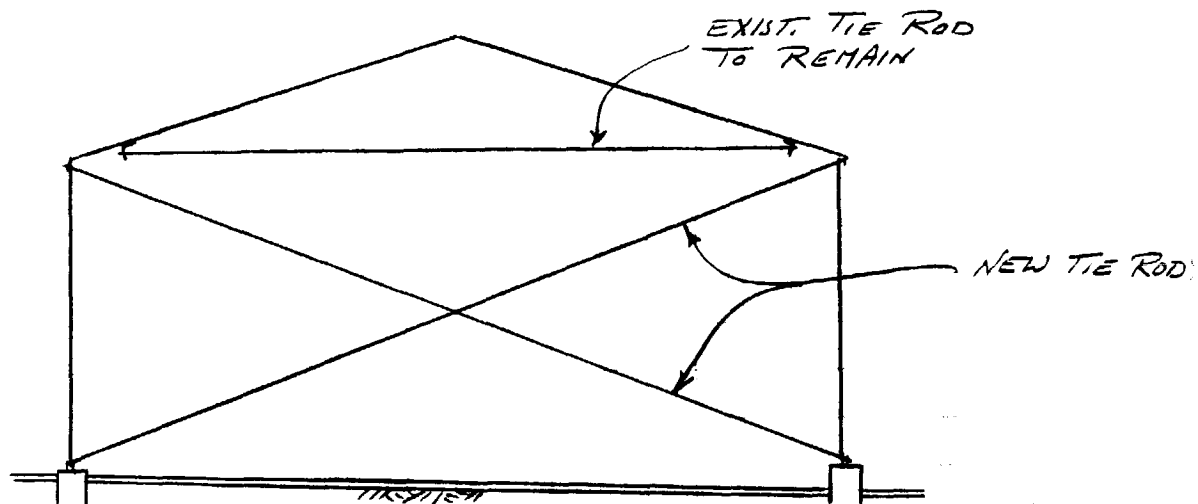
11

BY

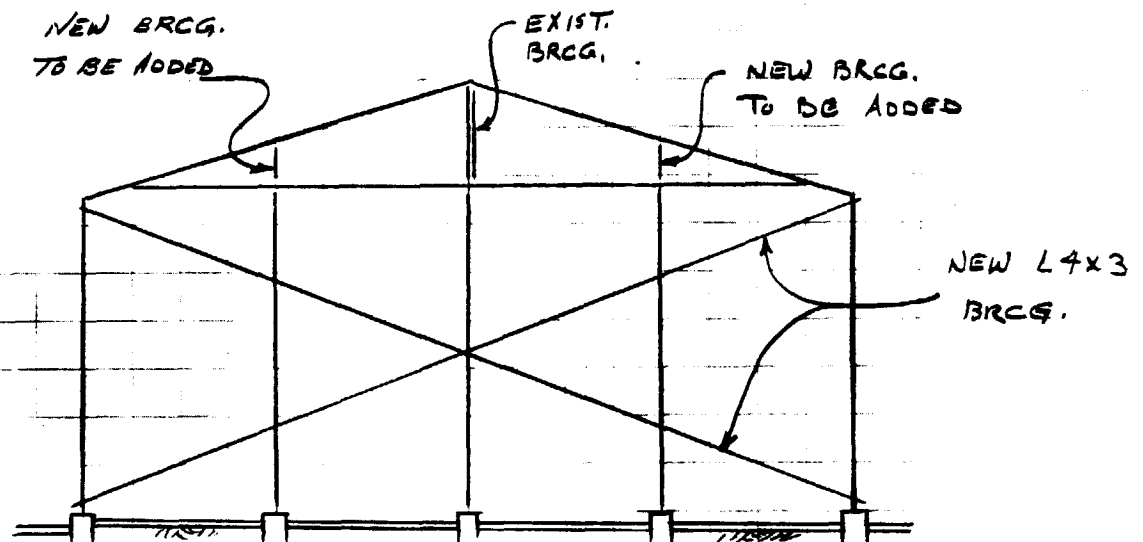
AS CHKD. PHR

JOB NO.

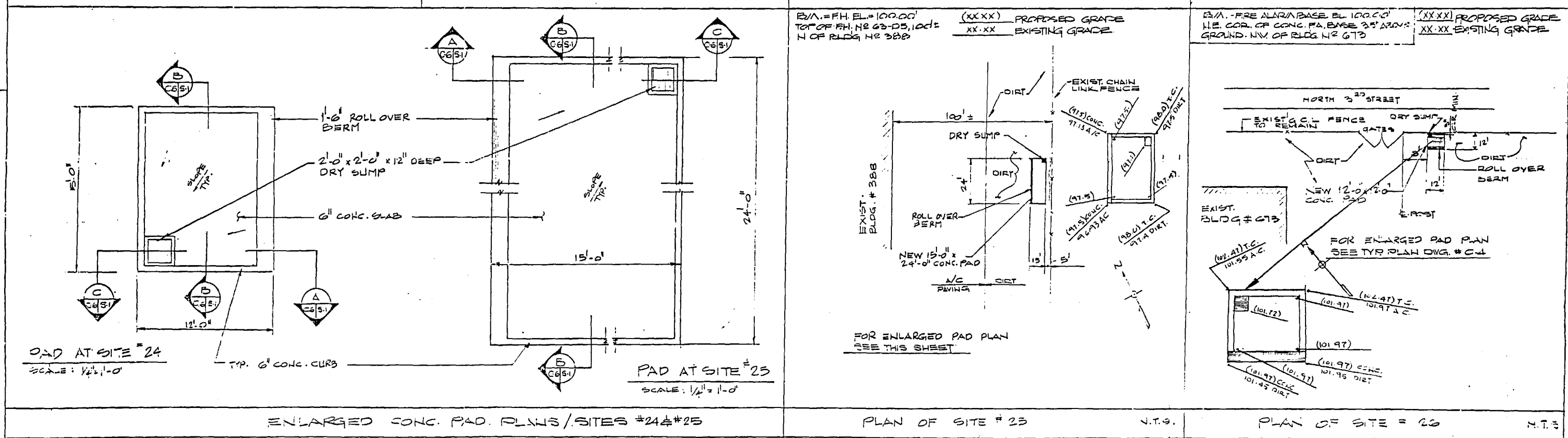
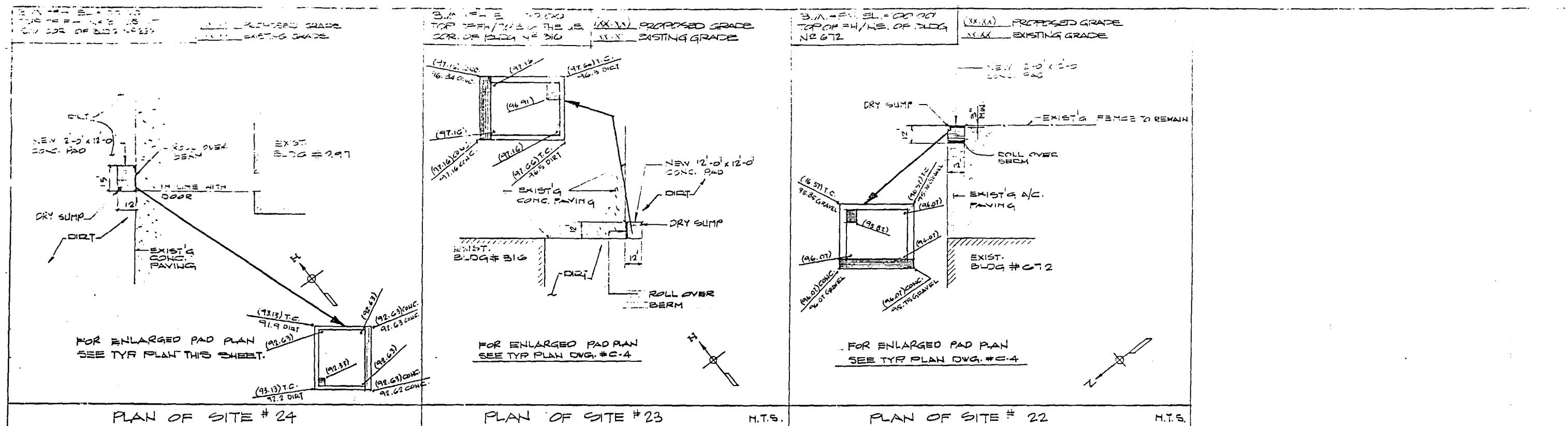
01-F138-ZX



ELEVATION X-X  
(INTERIOR BRACED FRAMES)



ELEVATION Y-Y  
(AT END WALLS)



**NOTE:**  
 FOR SHED ROOF @ SITES #1, #2, #3 (PAD 1) #4, #5, #9, #10, #11, #12, #13, #14, #17, #18, #19, #20, #22, #23, #24, #25, & #26 SEE DWG. #C-7

IF SHEET IS LESS THAN 24" X 36" IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY.

**DEPCO**  
 THE NATIONAL DEPCO COMPANY CORPORATION  
 ENGINEERING  
 ARCHITECTURE  
 CONSTRUCTION

**U.S. MARINE CORPS AIR STATION**  
 FACILITIES MANAGEMENT DEPARTMENT  
 PROJECT: DEPCO  
 PLAN OF PAD SITES #23, #24, #25 & #26

# APPENDIX F

# **MARINE CORPS AIR STATION ELTORO**



## **HAZARDOUS WASTE TRAINING PROGRAM**

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## HAZARDOUS WASTE FACILITY TRAINING PROGRAM

### INTRODUCTION:

THIS DOCUMENT FORMALLY ESTABLISHES THE MARINE CORPS AIR STATION EL TORO HAZARDOUS WASTE OPERATIONS TRAINING PROGRAM. THE TRAINING PROGRAM IS BASED ON RECOMMENDATIONS DEVELOPED BY THE NAVY ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY (NEESA) FOUND IN NEESA DOCUMENT 15-028. THE INTENT OF THE TRAINING PROGRAM IS TO INSTRUCT PERSONNEL INVOLVED IN HAZARDOUS WASTE MANAGEMENT TO PERFORM THEIR DUTIES IN SUCH A WAY THAT IS SAFE AND ENSURES FACILITY COMPLIANCE WITH ENVIRONMENTAL REGULATIONS.

### SCOPE:

INSTRUCTION WILL BE PROVIDED BY, BUT NOT LIMITED TO, THE FOLLOWING AGENCIES:

NAVY ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY

UNIVERSITY OF CALIFORNIA, IRVINE - HAZARDOUS SUBSTANCE MANAGEMENT CERTIFICATE PROGRAM

FACILITIES MANAGEMENT DEPARTMENT, ENVIRONMENTAL DIVISION

MCAS EL TORO BRANCH CLINIC, INDUSTRIAL HYGIENE

MCAS EL TORO GROUND SAFETY

THIRD MARINE AIR WING, SAFETY DEPARTMENT

TRAINING WILL BE GIVEN TO ALL PERSONNEL INVOLVED IN HAZARDOUS WASTE MANAGEMENT. AT A MINIMUM TRAINING WILL BE DESIGNED TO ENSURE THAT FACILITY PERSONNEL ARE ABLE TO HANDLE, TRANSFER, AND STORE HAZARDOUS WASTES SAFELY AND ARE CAPABLE TO RESPOND EFFECTIVELY TO EMERGENCIES. PERSONNEL WILL BE FAMILIARIZED WITH LOCAL EMERGENCY PROCEDURES, EMERGENCY EQUIPMENT, AND CONTINGENCY PLANNING.

DESCRIPTIONS WILL BE ESTABLISHED FOR EACH POSITION RELATED TO HAZARDOUS WASTE MANAGEMENT WHICH WILL INCLUDE QUALIFICATIONS AND RESPONSIBILITIES, INTRODUCTORY AND CONTINUING TRAINING, AND CERTIFICATION OF TRAINING.

SONNEL WILL BE GIVEN TRAINING WITHIN SIX MONTHS OF ASSIGNMENT OR WILL NOT  
WORK UNSUPERVISED UNTIL TRAINING HAS BEEN PROVIDED.

## HAZARDOUS WASTE FACILITY TRAINING MATRIX

SUBJECT	RESPONSIBILITY														
	HM/HW OFFICER HM/HW MONITOR	HM/HW MANAGER HM/HW COORDINATOR	HM Package	Records Administration	HM Inspectors	Contract Administrators	Facility Designers	Supply Administrators	TSD Facility Operators	Transporters	Fire Inspectors	Vehicle Inspectors	General Workers	Safety Inspectors	MGMT
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
A. LAWS & REGULATIONS	0	0	0	0	S	S	S	0	0	0	0	S	0	S	0
B. HEALTH EFFECTS	0	0	0	/	S	/	0	/	0	0	0	0	0	S	0
C. ENVIRONMENTAL EFFECTS	0	0	0	/	S	/	0	/	0	0	0	0	0	S	0
D. HANDLING	0	S	0	/	S	/	0	/	S	S	0	S	0	S	0
E. PACKAGING	0	0	S	/	S	/	0	0	0	S	0	S	0	0	0
F. MARKING & LABELING	0	S	S	/	S	/	0	0	S	S	S	S	0	0	0
G. PLACARDING	0	S	S	/	S	/	0	0	S	S	S	S	0	0	0
H. PROTECTIVE CLOTHING	0	0	0	/	S	/	0	0	0	S	S	S	0	0	0
I. RESPIRATORY PROTECTION	0	S	S	/	S	/	0	0	0	0	S	0	0	S	0
J. STORAGE TECHNIQUES	0	S	S	/	S	/	0	0	0	0	S	0	0	S	0
K. INFORMATION SOURCES	0	S	S	/	S	/	0	0	S	S	0	S	0	0	0
L. FIRE/EXPLOSION RESPONSE	0	S	S	/	S	/	0	0	S	S	S	S	S	S	0
M. EMERGENCY RESPONSE	0	S	S	/	S	/	0	0	S	S	S	S	S	S	0
N. CONINGENCY PLANNING	0	S	S	/	S	/	0	0	S	S	S	S	S	S	0
O. SITE SPECIFIC SYSTEM	0	S	S	/	S	/	0	0	S	S	S	S	S	S	0
P. SITE SPECIFIC CHEMICALS	0	S	S	/	S	/	0	0	S	S	S	S	S	S	0

\*-Depends on specific job

0-Overview of Subject

S-Subject covered in detail /-Not required

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL/HAZARDOUS WASTE OFFICER (WING LEVEL)

DESIGNATION: APPOINTMENT MADE BY THE RESPECTIVE COMMANDER TO OVERSEE HAZARDOUS WASTE OPERATIONS FOR THEIR RESPECTIVE COMMAND OPERATIONS.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. BE FAMILIAR WITH THEIR COMMAND OPERATIONS
3. POSSESS KNOWLEDGE OF PROPER HAZARDOUS WASTE HANDLING AND STORAGE REQUIREMENTS
4. BE FAMILIAR WITH STATION DISPOSAL PROCEDURES

### RESPONSIBILITIES:

1. INSPECTION OF EACH GENERATION SITE QUARTERLY, ANNOTATE DEFICIENCIES AND FORWARD THEM TO THE ENVIRONMENTAL DIVISION
2. NOTIFY THE ENVIRONMENTAL DIVISION OF ANY DEPLOYMENTS OR TRANSITIONS
3. ACT AS LIAISON TO THE ENVIRONMENTAL DIVISION ON ALL ENVIRONMENTAL MATTERS
4. ATTEND ENVIRONMENTAL PROTECTION COMMITTEE MEETINGS

### TRAINING REQUIREMENTS:

HAZARDOUS MATERIAL/HAZARDOUS WASTE OFFICERS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS & REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE

TRAINOR WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL/HAZARDOUS WASTE MONITOR (GROUP LEVEL)

DESIGNATION: APPOINTMENT MADE BY THE GROUP COMMANDING OFFICER TO MONITOR ALL HAZARDOUS WASTE OPERATIONS FOR THE GROUP.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. BE FAMILIAR WITH THEIR GROUP OPERATIONS
3. POSSESS KNOWLEDGE OF PROPER HAZARDOUS WASTE HANDLING AND STORAGE REQUIREMENTS
4. BE FAMILIAR WITH STATION DISPOSAL PROCEDURES

### RESPONSIBILITIES:

1. TO ENSURE THAT ALL GENERATORS WITHIN THE GROUP ARE MANAGING THEIR ACCUMULATION AREAS IN COMPLIANCE WITH ENVIRONMENTAL REGULATIONS
2. INSPECTION OF EACH ACCUMULATION SITE MONTHLY, ANNOTATE DEFICIENCIES AND FORWARD INSPECTION REPORTS TO THE ENVIRONMENTAL DIVISION
3. ACT AS LIAISON TO THE ENVIRONMENTAL DIVISION ON ALL ENVIRONMENTAL MATTERS
4. ATTEND ENVIRONMENTAL PROTECTION COMMITTEE MEETINGS

### TRAINING REQUIREMENTS:

HAZARDOUS MATERIAL/HAZARDOUS WASTE MONITORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS & REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE

TRAINOR WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL/HAZARDOUS WASTE MANAGER (SQUADRON LEVEL)

DESIGNATION: APPOINTMENT MADE BY THE COMMANDING OFFICER OF THE SQUADRON TO A MEMBER OF THE SAFETY OFFICE

### QUALIFICATIONS:

1. POSSESS SAFETY KNOWLEDGE
2. BE FAMILIAR WITH SQUADRON MAINTENANCE OPERATIONS
3. POSSESS A KNOWLEDGE OF PROPER HAZARDOUS MATERIAL HANDLING, DISPENSING, AND STORAGE
4. POSSESS KNOWLEDGE OF PROPER LABELING, HANDLING, AND STORAGE OF HAZARDOUS WASTE
5. POSSESS KNOWLEDGE OF STATION DISPOSAL POLICIES
6. POSSESS KNOWLEDGE OF HAZARD COMMUNICATION REQUIREMENTS

### RESPONSIBILITIES

1. INSPECT ACCUMULATION AREAS FOR COMPLIANCE WITH ENVIRONMENTAL REGULATIONS
2. COMPILE A COMPLETE LIST OF ALL HAZARDOUS MATERIALS USED AT THE SQUADRON AND UPDATE IT WHENEVER NECESSARY. FORWARD THIS LIST TO THE ENVIRONMENTAL DIVISION
3. MAINTAIN COPIES OFF ALL MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL HAZARDOUS MATERIALS USED IN THE SQUADRON
4. CONDUCT HAZARD COMMUNICATION TRAINING AS OFTEN AS NECESSARY FOR COMPLIANCE WITH REGULATIONS AND SAFETY
5. ATTEND ENVIRONMENTAL PROTECTION COMMITTEE MEETINGS

### TRAINING REQUIREMENTS:

HAZARDOUS MATERIAL/HAZARDOUS WASTE MANAGERS WILL BE GIVEN AN OVERVIEW OF THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
PACKAGING  
PROTECTIVE CLOTHING

HAZARDOUS MATERIAL/HAZARDOUS WASTE MANAGERS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

HANDLING  
MARKING & LABELING

8



RECORDING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEMS  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING WITH PRACTICAL APPLICATION. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL/HAZARDOUS WASTE COORDINATORS (SQUADRON LEVEL)

DESIGNATION: APPOINTMENT MADE BY THE COMMANDING OFFICER OF THE SQUADRON TO A MEMBER OF THE MAINTENANCE STAFF

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. BE FAMILIAR WITH SQUADRON MAINTENANCE OPERATIONS
3. POSSESS A KNOWLEDGE OF PROPER HAZARDOUS MATERIAL HANDLING, DISPENSING, AND STORAGE
4. POSSESS KNOWLEDGE OF PROPER LABELING, HANDLING, AND STORAGE OF HAZARDOUS WASTE
5. POSSESS KNOWLEDGE OF STATION DISPOSAL POLICIES

### RESPONSIBILITIES

1. ENSURE ALL DRUMS OF HAZARDOUS MATERIAL ARE PROPERLY LABELED, HANDLED, DISPENSED, AND STORED CORRECTLY
2. ENSURE ALL CONTAINERS OF HAZARDOUS WASTE ARE PROPERLY LABELED, HANDLED, STORED, AND DISPOSED OF PROPERLY
3. INSPECT HAZARDOUS MATERIAL/HAZARDOUS WASTE STORAGE AREAS DAILY FOR LEAKS AND SPILLS
4. INSPECT HAZARDOUS WASTE AREAS WEEKLY USING THE APPROVED CHECKLIST
5. COORDINATE ALL HAZARDOUS MATERIAL/HAZARDOUS WASTE AND ENVIRONMENTAL MATTERS WITH THE ENVIRONMENTAL DIVISION
6. ATTEND ENVIRONMENTAL PROTECTION COMMITTEE MEETINGS

### TRAINING REQUIREMENTS:

HAZARDOUS MATERIAL/HAZARDOUS WASTE COORDINATORS WILL BE GIVEN AN OVERVIEW OF THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
PACKAGING  
PROTECTIVE CLOTHING

HAZARDOUS MATERIAL/HAZARDOUS WASTE COORDINATORS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

HANDLING  
MARKING & LABELING  
PLACARDING  
RESPIRATORY PROTECTION

PAGE TECHNIQUES  
FORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEMS.  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING WITH PRACTICE APPLICATION. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL/HAZARDOUS WASTE PACKAGERS

DESIGNATION: SUPPLY DEPARTMENT PERSONNEL WHO WORK PACKAGING HAZARDOUS MATERIALS FOR DISBURSING AND HANDLING DAMAGED HAZARDOUS MATERIALS APPROPRIATELY.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF HAZARDOUS MATERIAL PACKAGING, LABELING, AND STORAGE REQUIREMENTS.
3. POSSESS KNOWLEDGE OF HAZARDOUS MATERIAL COMPATIBILITY AND SEGREGATION REQUIREMENTS
4. UNDERSTAND DEPARTMENT OF TRANSPORTATION SHIPPING REQUIREMENTS
5. UNDERSTAND PROPER HANDLING, STORAGE, AND DISPOSAL PROCEDURES FOR HAZARDOUS WASTE

### RESPONSIBILITIES:

1. ENSURE HAZARDOUS MATERIALS ARE LABELED, HANDLED, PACKAGED, STORED, SHIPPED PROPERLY
2. ENSURE DAMAGED HAZARDOUS MATERIALS ARE HANDLED AS HAZARDOUS WASTE
3. ENSURE HAZARDOUS WASTES ARE LABELED, HANDLED, STORED, AND DISPOSED OF PROPERLY
4. USE MATERIAL SAFETY DATA SHEETS APPROPRIATELY

### TRAINING REQUIREMENTS:

HAZARDOUS MATERIAL/HAZARDOUS WASTE PACKAGERS WILL BE GIVEN AN OVERVIEW OF THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PROTECTIVE CLOTHING

HM PACKAGERS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

PACKAGING  
MARKING AND LABELING  
PLACARDING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM

## THE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: RECORDS ADMINISTRATOR

DESIGNATION: THE RECORDS ADMINISTRATOR WILL BE DESIGNATED BY THE DIRECTOR, ENVIRONMENTAL

QUALIFICATIONS:

1. POSSESS GENERAL ADMINISTRATIVE KNOWLEDGE
2. POSSESS KNOWLEDGE OF RECORD KEEPING REQUIREMENTS FOR ENVIRONMENTAL COMPLIANCE

RESPONSIBILITIES

1. MAINTENANCE OF ALL PERMITS, REPORTS, MANIFESTS, AND DOCUMENTATION ASSOCIATED WITH HAZARDOUS WASTE MANAGEMENT
2. RECORD KEEPING AT ALL HAZARDOUS MATERIAL/HAZARDOUS WASTE INCIDENTS

TRAINING REQUIREMENTS: THE RECORDS ADMINISTRATOR WILL BE GIVEN AN OVERVIEW OF THE FOLLOWING AREAS:

LAWS AND REGULATIONS

INDUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: HAZARDOUS MATERIAL INSPECTORS

DESIGNATION: HAZARDOUS MATERIAL INSPECTORS ARE PERSONNEL ASSIGNED BY THE DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO) WHOSE RESPONSIBILITY IS TO INSPECT HAZARDOUS MATERIALS FOR REUTILIZATION AND RESALE.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF HANDLING, TRANSFER, AND STORAGE OF HAZARDOUS MATERIALS
3. POSSESS KNOWLEDGE OF DOCUMENTATION REQUIREMENTS FOR HANDLING, TRANSFER AND STORAGE OF HAZARDOUS MATERIALS
4. POSSESS KNOWLEDGE OF THE HANDLING, TRANSFER, AND STORAGE OF HAZARDOUS WASTE
5. BE FAMILIAR WITH THE LOCAL EMERGENCY AND CONTINGENCY PLANS REGARDING HAZARDOUS MATERIALS

TRAINING REQUIREMENTS: HM INSPECTORS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING AND LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

THIS TRAINING CAN BE SUBSTITUTED FOR SIMILAR TRAINING GIVEN BY THE DEFENSE LOGISTICS AGENCY (DLA) OR THE DEFENSE REUTILIZATION AND MARKETING SERVICE (DRMS)

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE TRAINOR WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN GIVEN.

## JOB DESCRIPTION

TITLE: HAZARDOUS WASTE CONTRACT ADMINISTRATOR

DESIGNATION: PERSONNEL FROM THE FACILITY SUPPORT CONTRACT BRANCH AND THE RESIDENT OFFICER IN CHARGE OF CONSTRUCTION (ROICC) WHO HAVE BEEN ASSIGNED CONTRACTS WHICH DEAL WITH HAZARDOUS WASTE MANAGEMENT, DISPOSAL, AND REMEDIATION.

### QUALIFICATIONS:

1. POSSESS KNOWLEDGE OF CONTRACTING LAWS, REGULATIONS AND STANDARDS
2. FAMILIARITY WITH ENVIRONMENTAL LAWS AND REGULATIONS REGARDING HAZARDOUS WASTE

### RESPONSIBILITIES:

1. TO ENSURE ALL CONTRACTING REGARDING HAZARDOUS WASTE MANAGEMENT, DISPOSAL, AND REMEDIATION IS DONE IN COMPLIANCE WITHIN THE CONTRACTURAL AGREEMENT
2. MONITOR THE CONTRACTORS PERFORMANCE DURING MANAGEMENT, DISPOSAL, AND REMEDIATION PROJECTS
3. TO ENSURE ALL CONTRACTING REGARDING HAZARDOUS WASTE MANAGEMENT, DISPOSAL AND REMEDIATION IS DONE IN COMPLIANCE WITH ENVIRONMENTAL REGULATIONS

TRAINING REQUIREMENTS: TRAINING WILL BE GIVEN IN THE FOLLOWING AREAS:

### LAWS AND REGULATIONS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.



## JOB DESCRIPTION

LE: FACILITY DESIGNERS

DESIGNATION: FACILITY DESIGNERS WILL INCLUDE THE CIVIL ENGINEERING BRANCH OF THE ENGINEERING DIVISION, STATION ENGINEER AND FACILITIES MANAGERS, AND FACILITY COORDINATION OFFICER.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF CIVIL ENGINEERING
3. POSSESS KNOWLEDGE OF REQUIREMENTS OF FACILITY STANDARDS FOR STORAGE OF HAZARDOUS MATERIALS/HAZARDOUS WASTE

### RESPONSIBILITIES

1. PROGRAMMING AND DESIGNING FACILITIES FOR HAZARDOUS MATERIALS AND HAZARDOUS WASTE
2. REVIEWING DESIGNS FOR HAZARDOUS MATERIAL AND HAZARDOUS WASTE FACILITIES

### TRAINING REQUIREMENTS:

FACILITY DESIGNERS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING AND LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

FACILITY DESIGNERS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: SUPPLY ADMINISTRATOR

DESIGNATION: SUPPLY ADMINISTRATORS WILL INCLUDE THE DIRECTOR OF SUPPLY, AND SECTIONS HEADS BOTH AT THE STATION AND WING SUPPLY DEPARTMENTS.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF THE HANDLING, TRANSFER, AND STORAGE OF HAZARDOUS MATERIALS
3. POSSESS KNOWLEDGE OF THE HANDLING, TRANSFER, STORAGE, AND DISPOSAL OF HAZARDOUS WASTE
4. FAMILIARIZATION OF EMERGENCY AND CONTINGENCY PLANS REGARDING HAZARDOUS MATERIALS AND HAZARDOUS WASTE

### RESPONSIBILITIES:

1. SUPERVISE THE DISPOSITION OF HAZARDOUS MATERIALS AND STORAGE OF HAZARDOUS MATERIALS
2. ENSURES THAT ALL SPILLS OF HAZARDOUS MATERIALS ARE REPORTED PROPERLY CLEANED-UP
3. ENSURES THAT ALL PERSONNEL ARE PROPERLY TRAINED IN HAZARDOUS MATERIAL AND HAZARDOUS WASTE MANAGEMENT
4. ENSURES THAT ALL PERSONNEL WEAR PROPER PERSONAL PROTECTIVE GEAR
5. ENSURES THAT ALL PERSONNEL ARE FAMILIAR WITH EMERGENCY PROCEDURES

### TRAINING REQUIREMENTS:

SUPPLY ADMINISTRATORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
PACKAGING  
MARKING AND LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: STORAGE FACILITY OPERATORS

DESIGNATION: THE STORAGE FACILITY OPERATORS WILL INCLUDE THE ENVIRONMENTAL STAFF AND STATION PERSONNEL DESIGNATED FOR ASSISTANCE IN OPERATION OF THE FACILITIES

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF REGULATIONS COVERING THE HANDLING, TRANSFER, STORAGE, AND DISPOSAL OF HAZARDOUS WASTE
3. POSSESS KNOWLEDGE OF EQUIPMENT IN STORAGE FACILITIES
4. POSSESS KNOWLEDGE OF FACILITY INSPECTION REQUIREMENTS
5. POSSESS KNOWLEDGE OF DOCUMENTATION, RECORD KEEPING, AND REPORTING REQUIREMENTS REQUIRED FOR THE OPERATION OF HAZARDOUS WASTE STORAGE FACILITIES
6. POSSESS KNOWLEDGE OF PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS
7. BE FAMILIAR WITH EMERGENCY AND CONTINGENCY PLANS REGARDING HAZARDOUS WASTE

### RESPONSIBILITIES:

1. INSPECTION OF STORAGE FACILITY WEEKLY USING THE REQUIRED INSPECTION CHECKLIST
2. ENSURE THAT ALL EQUIPMENT IS MAINTAINED PROPERLY AND IN WORKING CONDITION
3. ENSURE THAT ALL RECORDS OF RECEIPT AND DISPOSAL OF HAZARDOUS WASTE ARE KEPT IN COMPLIANCE WITH ENVIRONMENTAL REGULATIONS
4. ENSURE THAT ALL HAZARDOUS WASTES ARE HANDLED, TRANSFERRED, STORED, AND DISPOSED OF IN ACCORDANCE WITH ENVIRONMENTAL REGULATIONS
5. ENSURE THAT ALL SPILLS ARE REPOSTED PROPERLY AND CLEANED-UP

### TRAINING REQUIREMENTS:

HAZARDOUS WASTE STORAGE FACILITY OPERATORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
AGING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES

HAZARDOUS WASTE STORAGE FACILITY OPERATORS WILL BE GIVEN DETAILED TRAINING IN  
FOLLOWING AREAS:

HANDLING  
MARKING AND LABELING  
PLACARDING  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

HAZARDOUS WASTE STORAGE FACILITY OPERATORS WILL ATTEND THE FOLLOWING CLASSES  
GIVEN BY THE NAVY ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY

HAZARDOUS WASTE FACILITY OPERATORS COURSE  
HAZARDOUS WASTE FACILITY TRAINING DEVELOPMENT COURSE  
HAZARDOUS SUBSTANCE INCIDENT RESPONSE MANAGEMENT COURSE  
HAZARDOUS WASTE FACILITY OPERATORS REFRESHER COURSE

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL  
CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST  
ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE  
AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED

## JOB DESCRIPTION

FILE: HAZARDOUS WASTE TRANSPORTERS

DESIGNATIONS: PERSONELL ASSIGNED TO DRIVE THE VACUUM TRUCK USED FOR TRANSPORTATION OF USED JET FUEL, GASOLINE, AND OIL FROM MCAS TUSTIN TO MCAS EL TORO

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF HAZARDOUS WASTE TRANSPORTATION REGULATIONS
3. POSSESS KNOWLEDGE OF EMERGENCY RESPONSE ACTIONS
4. POSSESS GENERAL EQUIPMENT AND VEHICLE KNOWLEDGE TO INCLUDE VEHICLE INSPECTION AND MAINTENANCE REQUIREMENTS

### RESPONSIBILITIES:

1. TRANSPORTATION OF JET FUEL, GASOLINE, AND OIL FROM MCAS TUSTIN TO MCAS EL TORO
2. PREPARATION OF HAZARDOUS WASTE MANIFESTS
3. GENERAL VEHICLE SAFETY INSPECTIONS
4. PROPER VEHICLE PLACARDING

### TRAINING REQUIREMENTS:

HAZARDOUS WASTE TRANSPORTERS WILL BE AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES

HAZARDOUS WASTE TRANSPORTERS WILL BE GIVEN DETAILED INFORMATION IN THE FOLLOWING AREAS:

HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST

ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE  
TRAINOR WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

LE: FIRE INSPECTORS

DESIGNATION: FIRE INSPECTORS ASSIGNED TO THE STATION FIRE DEPARTMENT

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) REQUIREMENTS FOR STORAGE OF HAZARDOUS MATERIALS
3. POSSESS KNOWLEDGE OF HAZARDOUS MATERIAL COMPATIBILITY REQUIREMENTS
4. BE FAMILIAR WITH EMERGENCY AND CONTINGENCY PLANS REGARDING HAZARDOUS MATERIALS

### RESPONSIBILITIES

1. INSPECTIONS OF FACILITIES WHERE HAZARDOUS MATERIALS AND HAZARDOUS WASTES ARE STORED
2. PROVIDE GUIDANCE ON STORAGE OF FLAMMABLE AND COMBUSTIBLE MATERIALS
3. ASSIST IN RESPONSE EFFORTS DURING HAZARDOUS MATERIAL/HAZARDOUS WASTE INCIDENTS

### TRAINING REQUIREMENTS:

FIRE INSPECTORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
INFORMATION SOURCES

FIRE INSPECTORS WILL BE GIVEN DETAILED INFORMATION IN THE FOLLOWING AREAS:

MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: VEHICLE INSPECTORS

DESIGNATION: PERSONNEL ASSIGNED TO THE STATION MOTOR POOL WHICH ARE REQUIRED TO DO VEHICLE INSPECTIONS ON THE VEHICLE USED FOR TRANSPORTATION OF HAZARDOUS WASTE EITHER WITHIN THE STATION OR BETWEEN MCAS EL TORO AND MCAS TUSTIN

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE ON HAZARDOUS WASTE TRANSPORTATION REGULATIONS
3. POSSESS KNOWLEDGE OF PROPER VEHICLE MAINTENANCE AND SAFETY REQUIREMENTS

### RESPONSIBILITIES:

1. CONDUCT VEHICLE INSPECTIONS ON ALL VEHICLES USED FOR THE TRANSPORTATION OF HAZARDOUS WASTES
2. ENSURE INSPECTION RECORDS ARE KEPT ON ALL VEHICLES
3. ENSURE THAT VEHICLES ARE MAINTAINED PROPERLY AND HAVE ALL REQUIRED SAFETY EQUIPMENT

### TRAINING REQUIREMENTS:

VEHICLE INSPECTORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES

VEHICLE INSPECTORS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE AND THE TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.



## JOB DESCRIPTION

LE: GENERAL WORKERS

DESIGNATION: GENERAL WORKERS WILL INCLUDE MEMBERS OF THE LABOR SHOP ASSIGNED TO HAZARDOUS WASTE MANAGEMENT DUTIES.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF PROPER HANDLING, TRANSFER, AND STORAGE OF HAZARDOUS WASTE
3. POSSESS KNOWLEDGE OF EMERGENCY AND CONTINGENCY PLANS

### RESPONSIBILITIES:

1. TRANSPORTATION OF HAZARDOUS WASTE FROM ACCUMULATION SITES TO THE STORAGE FACILITY UNDER THE DIRECTION OF THE ENVIRONMENTAL OFFICE.
2. RESPONSE TO HAZARDOUS WASTE/HAZARDOUS MATERIAL SPILLS UNDER THE DIRECTION OF THE ENVIRONMENTAL OFFICE

### TRAINING REQUIREMENTS:

GENERAL WORKERS WILL RECEIVE AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES

GENERAL WORKERS WILL RECEIVE SPECIFIC TRAINING IN THE FOLLOWING AREAS:

INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL CONSIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE TRAINOR WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

LE: SAFETY INSPECTORS

DESIGNATION: SAFETY INSPECTORS INCLUDE MEMBER OF THE STATION GROUND SAFETY OFFICE AND THE WING SAFETY OFFICE WHO ARE RESPONSIBLE FOR DOING SAFETY INSPECTIONS.

### QUALIFICATIONS:

1. POSSESS SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF PROPER HANDLING, TRANSFER, STORAGE, AND DISPOSAL OF HAZARDOUS MATERIALS AND HAZARDOUS WASTES
3. POSSESS KNOWLEDGE OF PROPER PERSONNEL PROTECTIVE EQUIPMENT
4. POSSESS KNOWLEDGE OF EMERGENCY AND CONTINGENCY PLANS REGARDING HAZARDOUS MATERIALS AND HAZARDOUS WASTE.

### RESPONSIBILITIES:

1. INSPECT FACILITIES FOR POSSIBLE SAFETY HAZARDS TO INCLUDE SAFE STORAGE AND HANDLING OF HAZARDOUS MATERIALS AND HAZARDOUS WASTES
2. ENSURE THAT PERSONNEL ARE AWARE OF SAFETY AND HEALTH EFFECTS ASSOCIATED WITH HAZARDOUS MATERIALS AND HAZARDOUS WASTES
3. PROVIDE TECHNICAL SUPPORT DURING HAZARDOUS MATERIAL AND HAZARDOUS WASTE SPILLS

### TRAINING REQUIREMENTS:

SAFETY INSPECTORS WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
INFORMATION SOURCES

SAFETY INSPECTORS WILL BE GIVEN DETAILED TRAINING IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

INTRODUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL

C. SIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST JALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## JOB DESCRIPTION

TITLE: MANAGEMENT

DESIGNATION: MANAGEMENT INCLUDES COMMANDING OFFICERS, EXECUTIVE OFFICERS, AND DIRECTORS.

### QUALIFICATIONS:

1. POSSESS GENERAL SAFETY KNOWLEDGE
2. POSSESS KNOWLEDGE OF GENERAL HAZARDOUS MATERIAL AND HAZARDOUS WASTE MANAGEMENT
3. POSSESS KNOWLEDGE OF EMERGENCY PROCEDURES REGARDING HAZARDOUS MATERIALS AND HAZARDOUS WASTE

### RESPONSIBILITIES:

1. ENSURE THAT THE UNIT/SQUADRON CONDUCTS PROPER HAZARDOUS MATERIAL AND HAZARDOUS WASTE MANAGEMENT
2. ENSURE THAT THE UNIT/SQUADRON CONDUCTS SAFE HAZARDOUS MATERIALS AND HAZARDOUS WASTE OPERATIONS
3. ENSURE THAT THE UNIT/SQUADRON IS FAMILIAR WITH EMERGENCY AND CONTINGENCY PLANS

### TRAINING REQUIREMENTS:

MANAGEMENT WILL BE GIVEN AN OVERVIEW IN THE FOLLOWING AREAS:

LAWS AND REGULATIONS  
HEALTH EFFECTS  
ENVIRONMENTAL EFFECTS  
HANDLING  
PACKAGING  
MARKING & LABELING  
PLACARDING  
PROTECTIVE CLOTHING  
RESPIRATORY PROTECTION  
STORAGE TECHNIQUES  
INFORMATION SOURCES  
FIRE/EXPLOSION RESPONSE  
EMERGENCY RESPONSE  
CONTINGENCY PLANNING  
SITE SPECIFIC SYSTEM  
SITE SPECIFIC CHEMICALS

A MANAGEMENT OVERVIEW WILL BE GIVEN AS DEEMED NECESSARY BY COMMAND

## TRAINING RECORD

Name

Unit

## Job Description

Signature (For Training  
Certification)

[illegible]

I, \_\_\_\_\_, certify by signature that the above individuals have completed the training described in Attachment 1.

Signature

Date

TRAINING RECORD  
ATTACHMENT 1

Instructor(s):

Date of Training:

Location of Training:

Length of Training:

Description of Training:

## S 3 SPECIFIC CHEMICALS

DUCTORY TRAINING WILL BE GIVEN WITHIN SIX MONTHS OF ASSIGNMENT AND WILL  
LIST OF CLASSROOM TRAINING. CONTINUING TRAINING WILL BE GIVEN AT LEAST  
ANNUALLY OR WHEN DEEMED NECESSARY. UPON COMPLETION OF TRAINING, THE TRAINEE  
AND TRAINER WILL CERTIFY BY SIGNATURE THAT THE TRAINING HAS BEEN COMPLETED.

## ENVIRONMENTAL PROTECTION ASSISTANT

### INTRODUCTION

This position is located in the Energy/Environmental Branch (Code 1JG), Facilities Management Department (Code 1JA) at MCAS El Toro. The primary purpose of this position is to perform as a leader to coordinate and direct field operations on the activity to insure compliance with federal, state, and local environmental regulations and Marine Corps directives in the specific areas of air quality, water quality, and hazardous waste management.

### MAJOR DUTIES

1. Coordinates the hazardous materials handling duties for customer generated, containerized or bulk volume hazardous waste destined for temporary storage and ultimate disposal. Acts as a member of the Spill Response Team. Duties include:

a. Interpreting and implementing guidelines of acceptability, rejection, or need for special handling of excess materials based on labeling, packaging, chemical composition, or customer supplied information designating proper storage locations within collection, storage, and transfer (CST) facility or temporary storage to prevent the mixing of incompatible substances; recommending material reuse; performing container integrity inspections as required by law; performing packaging/repackaging to meet regulatory agency safety requirements; monitoring, for safety and legal purposes, the loading or unloading of hazardous waste at CST facilities by government or contractor forces; completing, in the course of above work, legally mandated record keeping forms; and completing the necessary documents for the ultimate disposal of the hazardous waste placed at the CST facility.

b. Resolving problems requiring investigation of unsanitary or questionable conditions, analyzing the source and the cause and recommending appropriate action to correct the undesirable conditions; such as maintenance or operation difficulties and excessive costs.

c. Making independent field decisions based on experience and education, regarding hazardous waste management program.

d. Performing as the assistant to the on scene coordinator in response to, and clean up of, a hazardous waste spill.



## SUPERVISORY CONTROLS

Assignments are in the form of broad functional responsibilities together with overall objectives. Guidance on policy matters will be provided by the Environmental Director. Specific projects, work to be done, or priorities, and deadlines are established by the Environmental Engineer. The incumbent independently, will plan own work, coordinate with other environmental specialists, resolve problems, supervise hazardous substance processors, and carry assignments through to completion.

## GUIDELINES

Guidelines include catalogs, publications, higher headquarters policy and program directives, including The California Administrative Code, Title 22; various federal laws for pollution abatement, and Marine Corps Order P11000.8. The incumbent applies judgment and initiative in selecting among alternative approaches and applying standard methods and techniques to solve varied technical problems, such as the need to modify a facility to accommodate increased loads, or to comply with stricter hazardous waste disposal regulations. All assignments are characterized by the performance of difficult and responsible work requiring the independent selection, evaluation, and application of standard guides, techniques, methods, and criteria, some of which require substantial adaption or modification in order to carry out effective and continuing programs.

## COMPLEXITY

The incumbent is expected to be thoroughly familiar with governing policies, practices, and regulatory material. Assignments typically involve several features, including scheduling or solving on site technical problems. The position requires ingenuity and creative thinking in devising new ways of accomplishing objectives and in adapting existing equipment or current techniques to new situations.

## SCOPE AND EFFECT

The purpose of the position is to implement hazardous waste management, and air/water quality programs affecting public safety, health and welfare, as well as the natural resources of MCAS El Toro, MCAS Tustin and the surrounding community.

**APPENDIX G**

**OIL AND HAZARDOUS SUBSTANCES POLLUTION  
CONTINGENCY PLAN**

**OIL SPILL PREVENTION, CONTROL  
COUNTERMEASURE PLAN AND  
CONTINGENCY PLAN**

**MARINE CORPS AIR STATION EL TORO, CALIFORNIA**

**JULY 1992**

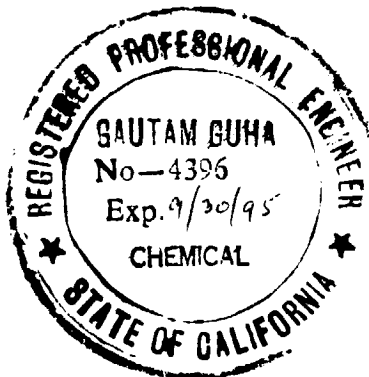
**To be amended in January 1995**

## **EXECUTIVE SUMMARY**

This Spill Prevention, Control and Countermeasure (SPCC) Plan has been prepared to comply with Title 40, Code of Federal Regulations, Part 112. This plan addresses spill prevention measures for all oil storage and transfer at MCAS, El Toro, California. Preparation of this plan has been in accordance with the guidance of the Naval Energy and Environmental Support Activity (NEESA) "Oil Spill Prevention, Control and Countermeasures Planning Manual", NEESA 7-030, June 1998. This plan serves as a statement of command policy and intent, as well as a working document for personnel involved with oil storage and transfer, and for those concerned with spill prevention. This plan also meets the requirements of Title 40, Code of Federal Regulations, Part 264, Subpart D for a Contingency Plan.

**CERTIFICATION**

I hereby certify that I have examined the facility, and being familiar with the provision C of 40 CFR 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.



GAUTAM GUHA

Printed Name of Professional Engineer

Gautam Guha

Signature of Professional Engineer

Date 7/9/92

Registration No. CH 4396 State CA

## RECORD OF AMENDMENT

As described in Chapter 1, this SPCC plan must be reviewed and recertified every three years by a professional engineer. The MCAS El Toro Environmental Department Environmental Director will be responsible for keeping the most recent copy of this plan.

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Date	Amendments	Professional Engineer	Reg. No.	State
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Attachment 6	MCAS El Toro Fire Department Emergency Van Equipment List
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Attachment 8	Evacuation Plan

## **1.0 INTRODUCTION**

### **1.1 Oil Spill Prevention Planning Requirements**

MCAS El Toro activities are directed by Marine Corps Order 1 1000.8B to comply with the requirements of Title 40, Code of Federal Regulations, Part 112 (40 CFR 112) and to develop Spill Prevention, Control, and Countermeasure (SPCC) plans for applicable facilities. This plan is required at MCAS El Toro because oil storage capacities at this facility are large enough to fall under the requirements of 40 CFR 112. In addition, MCAS El Toro has the potential to discharge oil to U.S. navigable waters. This SPCC plan is an engineering and management strategy to prevent MCAS El Toro from discharging oil and impacting the quality of U.S. surface waters. The Naval Energy and Environmental Support Activity "Oil Spill Prevention, Control, and Countermeasures Planning Manual," NEESA 7-030, June 1988, has been used as a guide in developing this SPCC plan in accordance with 40 CFR 112 requirements. The text of 40 CFR 112 is provided in Attachment 1.

40 CFR 112 requires that storage tanks and pipelines be compatible with the material being stored; be periodically tested; have corrosion protection, overfill prevention devices, and adequate pipe supports; and have provisions for traffic protection and early departure prevention. In addition the facility is required to have spill containment structures, facility drainage control and security measures. Finally, 40 CFR 112 requires that personnel be instructed and briefed on proper spill prevention procedures and requirements; that standardized written operating procedures be used; that inspections are routinely performed to insure proper operation of equipment; and that records are maintained to document the successful implementation of these personnel requirements.

In addition to the requirements listed which must be met, the following criteria must also be addressed:

1. Hazardous materials and waste must be stored, disposed of, and accumulated in areas where the potential will be minimal for affecting the environment outside MCAS El Toro facilities by ensuring that these materials will not enter the environment as the result of high water, precipitation runoff, wind, storage facility failure, accidents in operations, or unauthorized activities.
2. Measures implemented to prevent the above occurrences will be judged on the basis of: (1) the potential for a given event to occur, and (2) the potential for injury to personnel and the environment by the nature and quantity of the material and by the physical design of the facility.

## **1.2 General Information**

### Location

MCAS El Toro includes approximately 4,700 acres located in unincorporated territory within Orange County, California. It is approximately 7 miles east of the City of Irvine and approximately 10 miles northeast of Newport Bay (Figure 1-1). The area is bordered by agricultural land on the north and southeast and by the Atchison, Topeka & Santa Fe railroad on the southwest. MCAS Tustin is located approximately 5 miles to the northwest.



### Purpose

The facility is the headquarters for the Commander, Marine Corps Air Bases, Western Area (COMCABWEST). Its primary mission is "to maintain and operate facilities and provide services and materials to support the operations of aviation activities and units of the operations forces of the Marine Corps, Navy and other activities, as designated by the Commandant of the Marine Corps in coordination with the Chief of Naval Operations" (NBS/Lowry, 1987). Therefore, a large number of military aircraft are operated and maintained at this facility.

### Geology

The site is located on Quaternary age alluvial deposits on the west flank of the northern Santa Ana Mountains. The facility elevation ranges from approximately 220 feet MSL on the southwest to 780 feet MSL on the northeast. Groundwater is generally 100-200 feet below the ground surface beneath the site.

### Surface Drainage

Surface drainage is controlled by a series of concrete-lined and earthen channels. Aqua Chinon and Bee Canyon Washes carry rainwater from the mountains into aqueducts which cut across the station. Additional surface drainage control is provided by Borrego Canyon Wash on the southwest border of the facility and Rifle Range Road Ditch on the west side of the facility. These channels drain to San Diego Creek approximately 1-1/2 miles southwest of the facility and then into Newport Bay.



### **1.3 Oil Use and Spill History at MCAS El Toro**

MCAS El Toro uses jet fuel (JP-5), No. 2 heating oil, diesel fuel, and three grades of motor fuel, and generates waste oil, the majority of which is stored in underground storage tanks. Other hazardous materials and wastes such as solvents, lube oil, and thinners are stored in DOT-approved containers.

Several unauthorized releases have occurred at the station in 1988, 1989, and 1992. In August, 1988 a 108,000 gallon capacity JP-5 storage tank (Tank No. 398) was reported to be leaking based on the presence of petroleum product observed in the surrounding soil during investigations for the replacement of the fueling system. The quantity of JP-5 fuel lost by this release to the soil is unknown. The unauthorized release was reported to the Orange County Health Care Agency by MCAS El Toro Environmental Department. Testing and leak detection conducted on the tank and piping in early 1989 showed that a small leak existed in the piping. The leak was repaired and in early 1990, a characterization study of the site was conducted. The study shows significant soil and groundwater contamination in the area.

A spill occurred at VMGR 352 in April 1992. The spill was due to Marines not following proper fuel transfer procedures. Approximately 120 gallons of JP-5 entered the storm sewer and collected at Bee Canyon weir; it was pumped out and properly disposed of. Station personnel cleaned up the spill.

In May 1992, an accident involving a Maytag refueler truck resulted in the release of approximately 250 gallons of JP-5 to the asphalt and soil. The spill is currently being remediated by Maytag personnel.

## **1.4 Designation of Responsibility**

The responsibility for oil spill prevention at MCAS El Toro ultimately lies with the Commanding General. However, a chain of command has been established to ensure compliance with the various components of this SPCC plan. The following departments and personnel at MCAS El Toro have the responsibility of implementing this plan.

### **1.4.1 Environmental Department**

The Environmental Department, under the direction of the Assistant Chief of Staff of the Environment, is responsible for planning, programming and ensuring funding for SPCC construction projects. It is also the Environmental Department's responsibility to implement the SPCC plan.

The Environmental Department's responsibilities include:

- Conducting facility surveys at least once every three years to determine if modifications are required to achieve compliance with SPCC guidelines.
- Review of all plans and drawings related to oil storage, handling or transfer facilities for new construction, maintenance, or remodeling to determine if amendment to the SPCC plan is required.
- Initiation of facility modifications to achieve compliance with the SPCC guidelines by submitting projects as soon as possible.

- Providing periodic SPCC training to employees at MCAS El Toro to ensure that employees understand their responsibilities concerning implementation of the SPCC plan as required by 40 CFR 112. Maintain records of personnel training, dates, and attendance.
- Updating of the SPCC plan to assure that it is current and responsive to the activities and operations performed at the Air Station.
- Providing technical assistance and analyses to the MCAS El Toro hazardous materials response team which is the on-scene operations team.
- Implementing of the Spill Contingency Plan as provided in Attachment 2.

#### **1.4.2      Supply Department**

The MCAS El Toro supply department is responsible for procurement of necessary material and dispensing fuel. It also performs the following:

- Inspects fuel systems
- Contacts the Environmental Department if there are any problems
- Provides necessary equipment for spill mitigation.

#### **1.4.3 Provost Marshall's Office (PMO)**

The PMO provides security functions at MCAS El Toro, and performs the following SPCC-related tasks:

- Inspection of installation perimeter fence to ensure that spills do not result from unauthorized entry.
- Visual inspection of vehicles that are delivering fuels to the MCAS for leaks and any obvious mechanical deficiencies which could cause a spill event or accident.
- Security inspections after regular working hours.

#### **1.4.4 Facilities Management Department**

The Facilities Management Department will be responsible for the implementation of SPCC construction and repair projects and requested maintenance. It is also responsible for:

- Providing necessary spill cleanup equipment
- Providing trained personnel for spill mitigation.

#### **1.4.5      Facility Supervisors**

Supervisors at facilities that handle or store petroleum products/hazardous materials are responsible for:

- Identifying the number and types of personnel needing training and coordinating necessary spill prevention training with the Environmental Department. New employees will be trained within six months from the date of employment.
- Coordinating with the Environmental Department in the development of safety, security and facility inspection logs for the equipment and facilities under the supervisor's cognizance.
- Conducting regular facility inspections.
- Initiating corrective actions for deficiencies found during inspections.
- Identifying, and in minor cases, implementing preventative maintenance.

#### **1.4.6      On-Scene Operations Team**

On-Scene Operations Team (OSOT) is organized by the MCAS El Toro Fire Department. The OSOT will respond to spills and related incidents in conjunction with the MCAS El Toro Crash Crew or Fire Department. If a spill occurs near the aircraft runway or aircraft operation areas, the MCAS El Toro Crash Crew will respond. Elsewhere, the MCAS El Toro Fire Department will

respond. Fire Department response capabilities are provided in an October 11, 1989 memorandum included in Appendix D. The OSOT will assist the Crash Crew and Fire Department as necessary and in accordance with the protocol identified in the Spill Contingency Plan provided in Attachment 2.

#### **1.4.7      Employees**

MCAS El Toro personnel will follow rules and procedures for safe work and will correctly respond in accordance with the Spill Contingency Plan (Attachment 2) if a spill occurs.

### **1.5      Plan Review and Amendment**

This plan supersedes a previous plan dated June 2, 1987, prepared for MCAS El Toro by NBS/Lowery. This plan will be effective for three years from its implementation date. When the Environmental Director determines that there is a change in a facility design, construction, operation or maintenance which materially affects the potential for an oil spill, the plan will be amended accordingly.

After three years, a complete audit of the oil facilities at the station will be performed to verify conformance with the requirements of 40 CFR 112. Additionally, this review will include an assessment of new spill prevention technology that has become available since the plan was last reviewed.

## 1.6 Summary of Construction and Work Projects

Identified below are hazardous materials/hazardous waste related structures that will be built, and damaged or deteriorated equipment that will be repaired. The following is a summary of these projects:

Project No./ Work Request	Description	Status
P-341	Hazardous/Flammable Materials 16,000 SF Storage 10-150 SF Lockers	Under Design
37-048-89	5 Concrete-lined Sumps in Hazardous Waste Storage Building	Completed
37-058-89	20' x 20' x 4" berm for Hazardous Waste Staging Area	Completed
ET821R	Drop Tank Drainage Area	Under Design
ET823R	Hazardous Waste Storage Facility	Under Design
---	Underground Storage Tank Testing Program	In Progress

## 2.0 FACILITY SPCC PLANS

This chapter discusses spill prevention measures which are in place and additional measures recommended for sites within MCAS El Toro that have the potential for an oil spill. A base survey was conducted with Environmental Department personnel to determine which facilities, due to their storage capacity, location in environmentally sensitive areas, or potential to discharge oil into navigable waters, require preparation of a site-specific SPCC plan. Eight facility categories met one or more of the above criteria. Table 2-1 lists the eight categories requiring a site-specific SPCC plan. Attachment 3 provides a list of the tanks at MCAS El Toro. Figure 2-1 shows the locations of the sites at MCAS El Toro.

### 2.1 Tank Farms

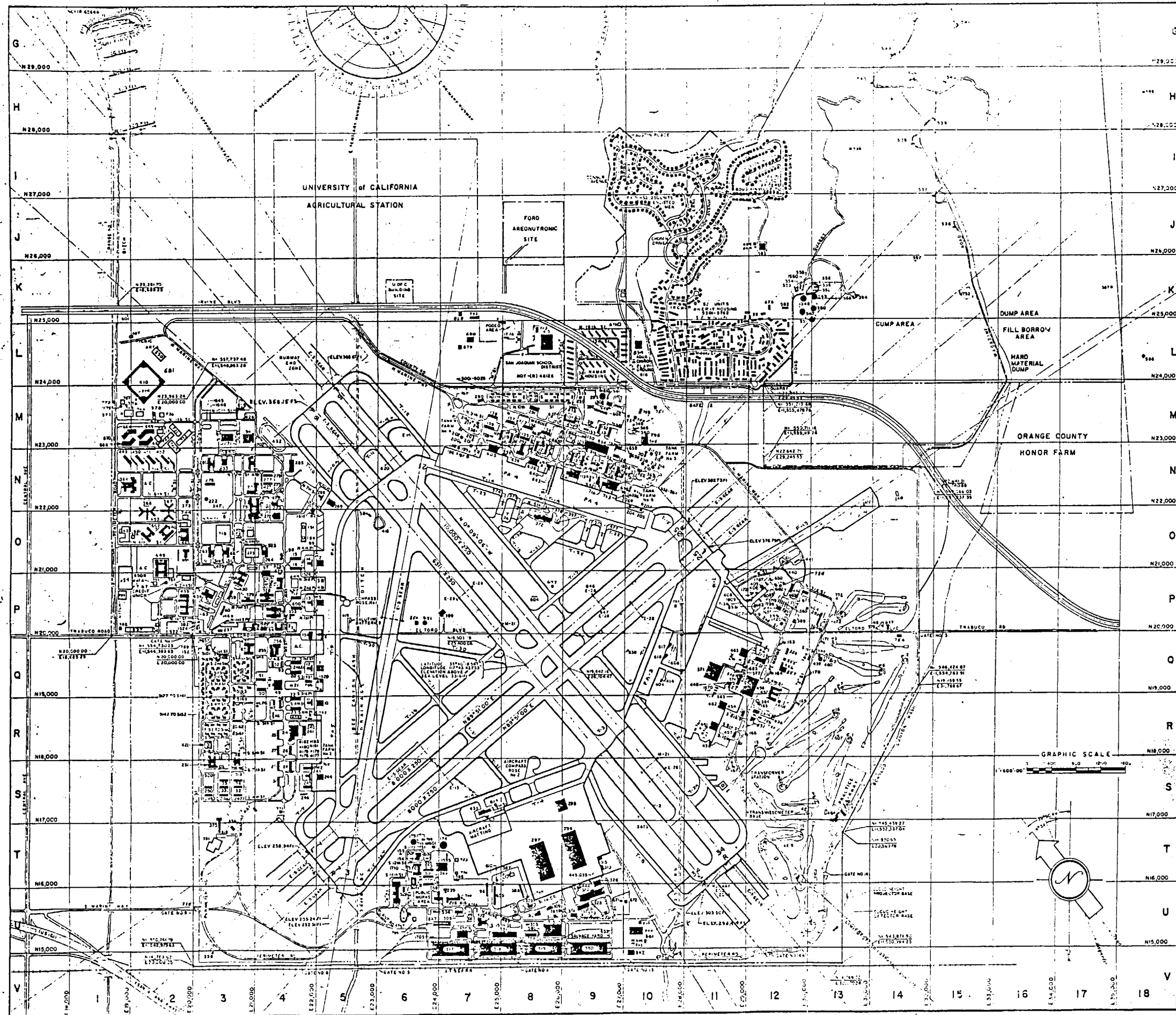
MCAS El Toro operates four tank farms. Their locations are identified on Figure 2-1 by map grid No. as follows:

<u>Tank Farm No.</u>	<u>Map Grid No.</u>
4	M, N-7
5	N-10
6	N-10
555	K-12, 13



**Table 2-1**  
**Oil-Handling or Storage Sites at MCAS El Toro**

Section No. In Plan	Description	Type of Operation
2.1	Tank Farm No. 4 400,000 gallons	11 Underground Tanks/Gasoline, JP-5 Loading/Unloading (Tank Nos. 196-203, 216-218)
2.1	Tank Farm No. 5 300,000 gallons	8 Underground Tanks/JP-5, Loading/Unloading (Tank Nos. 208-215)
2.1	Tank Farm No. 6 175,000 gallons	4 Underground Tanks/Gasoline, JP-5, Loading/Unloading (Tank Nos. 204-207)
2.1	Tank Farm 555 2,835,000 gallons	5 Underground Tanks Pipeline Receiving/JP-5, Loading/Unloading Pipeline to 398 and Fuel Farm No. 5 (Tank Nos. 547-551)
2.2	Day Tank 108,000 gallons	Underground Tank/Aircraft Refueling at 4 hot fueling islands, JP-5 (Tank No. 398)
2.3	Motor Vehicle Filling Stations 121,000 gallons	Gasoline/Diesel Dispensing, Motor Oil (Tank Nos. 298A, 298B, 637-1, 637-2, 637-3, 651-1, 651-2, 651-3, 651-4, 651-5, 651-6, 800A, 800B, 800C)
2.4	Test Cells 40,000 gallons	4 underground tanks/JP-5 (Tank Nos. 447A, 447B, 658A, 658B)
2.5	Other Fuel Tanks 127,100 gallons	Fuel Storage, Diesel, Gasoline, No. 2 Fuel Oil, JP-5 (Tank Nos. T-A, T-B, T-2, T-3, T-6 T-7, T-10, 380A, 380B, 388D, 388E, 439A, 797, 862)
2.6	Waste Oil/Waste JP-5 Tanks 152,800 gallons	Waste Oil/Waste JP-5 Storage (Tank Nos. T-C, T-4, 189, 191, 314B, 625, 651-7, 673B, 800D, 800E)
2.7	Hazardous Waste Storage Area	1 Year Hazardous Waste Storage (Building 673-T3)
2.8	Hazardous Waste Accumulation Areas	27 Sites, 90-day Hazardous Waste Storage (Various Buildings)



ISSUE	DESCRIPTION	DATE	BY	CHKD
DESIGNED:	<div>MCAS EL TORO</div> <div>SPCC</div> <div>SITE MAP</div>			
DRAWN BY:				
CHECKED BY:				
DATE:				
FIGURE 2-1		ISSUE	SHEET	

### **2.1.1      Storage**

Fuel is stored in underground tanks at the tank farms. The tanks at Tank Farm Nos. 4 through 6 are constructed of concrete materials with steel top and bottom. Fuel transfer operations at these three tank farms are provided by tank trucks. In addition, the four JP-5 storage tanks in Tank Farm No. 5 are connected by direct pipelines to Tank Farm No. 555. All piping associated with underground storage tanks in all Tank Farms is cathodically protected by induced current method.

Tank Farm No. 555 tanks are constructed of concrete walls with steel top and bottom. This Tank Farm serves primarily as a JP-5 bulk storage facility with five 567,000-gallon tanks receiving JP-5 fuel through a pipeline from Norwalk, California. Under Project P-387, liquid level indicators were installed in each of these tanks. Under Project ET-309M, fuel pumps, motors, check valves, filters, pantograph arms, hose, couplings, regulating valves, electrical controls, supply lines, fuel lines and fencing have been replaced at each of the fuel farms.

The tank inventory reconciliation and facility general inspections are performed daily. A tank testing and inspection program is in progress for all Tank Farm tanks.

### **2.1.2      Transfer**

Fuel is delivered to the tank farms by tank truck or pipeline. Transfer piping at the tank farms consists of both underground and aboveground piping. Valves, pumps and hose connections are located in concrete vaults below grade which

are intended to contain spillage which might occur during fuel transfer operations. Underground pipelines are constructed of steel and are cathodically protected to provide protection against corrosion.

Aboveground pipelines lead from the tanks to the loading racks and have pipe supports properly spaced to carry their structural load and allow for free axial movement. The pipelines are painted to provide protection against corrosion.

The direct pipeline system to Tank Farm No. 555 is controlled by manually operated valves from the pipeline to each of the five 567,000-gallon capacity underground tanks. These tanks are each equipped with a receiving valve pit, a vent and gauging pit, and a pumping pit.

### **2.1.3      Spill Prediction**

The potential for spills to occur during fuel transfer is fairly significant due to the large volume of fuel and numerous underground tanks and loading/unloading facilities. Possible causes of discharges from the tanks include tank leaks from cracks or corrosion, holes, and overfilling. Additionally, concrete tanks have been found to leach light petroleum products. Leakage from one of the tanks could result in loss of several thousand gallons associated with an undetected slow leak. A catastrophic failure resulting in the rapid loss of the entire contents of any Tank Farm UST is highly unlikely since the tanks are located underground and cannot drain by gravity.

Pipeline leaks are often more common particularly due to corrosion or stress fractures. An aboveground pipeline leak would be readily identified during

regular facility use and operational activity, and therefore limit the amount of spillage. Underground pipeline leaks without proper leak detection devices could go undetected for significant periods of time before being discovered. The resultant loss of product from an underground pipeline could be thousands of gallons depending on the frequency of fuel transfers through the particular leaking pipeline. If no pumping is occurring from the underground pipeline the maximum loss would be equal to the maximum amount of fuel stored within the length of the pipeline.

Leaks from the underground tanks or pipelines would contaminate the adjacent backfill material and then the surrounding soil, and if in sufficient quantity, could reach the groundwater.

Potential spill sources in the loading areas include overfilling of the tank truck, or a hose or piping rupture during fuel transfer to, or from the storage tanks. Maximum spillage due to transfer from the tank truck would be equivalent to one compartment of the tank truck. Maximum spillage during transfer from a tank to a tank truck may be controlled by the presence of facility personnel and easy detection during the fuel transfer.

#### **2.1.4      Containment**

Under Project No. P-387 spill containment structures (pits) have been constructed at the tank farm loading/unloading areas and at the storage areas for surface spills. They have been designed to hold the entire contents of the largest compartment of the tank truck plus sufficient freeboard for precipitation.

The containment structures are constructed of concrete and are compatible with the fuel. When a spill occurs the liquid remains in the containment structure pits.

#### **2.1.5      Drainage Control**

All surface drainage from the Tank Farms is directed to the Station's storm drainage system. All water in the system passes through oil/water separators before being pumped to the sanitary sewer. This system's effectiveness is dependent on the control valves and the oil/water separators not being overloaded (oil levels are monitored and oil is removed when needed). Overload may occur during heavy rain periods.

#### **2.1.6      Security**

Each tank farm is secured by a chain-link fence. Gates are locked when the areas are unattended. Starter controls are locked in the "off" position, or are fenced so that the controls are accessible only to authorized personnel. Tank farm lighting consists of mercury vapor lamps to illuminate the tank area and loading/unloading areas.

#### **2.1.7      Administration**

Departments responsible for oil spill prevention are as follows:

Tank Farm No.	4	Supply Department
Tank Farm No.	5	Supply Department
Tank Farm No.	6	Supply Department
Tank Farm No.	555	Supply Department

Their responsibilities include implementation of spill prevention procedures, inspections, recordkeeping and providing suggestions for amendments to the SPCC plan as needed.

Tank farm personnel check tank liquid levels and perform general inspection. Maintenance is provided by the Facilities Management Department. Tank farm personnel are trained on the facility operations and spill response. Fuel delivery, transfer, and inspection records are kept by tank farm personnel. An On-Scene Operations Team will assist the MCAS El Toro Fire Department for spills defined in Table 2-2.

#### **2.1.8      Recommendations**

A UST Management Plan should be prepared to summarize routine operating procedures, testing and maintenance programs, and spill control measures. It is essential that the underground storage tanks be maintained in accordance with current federal, state and local regulations. Current regulations require existing underground tanks to be tested annually for integrity, to be installed with corrosion protection and continuous pipeline leak detectors, and to be maintained with daily inventory reconciliation records. New tanks must be double-walled with continuous leak detection capabilities. As of January 1, 1990 the State of California requires that integrity tests be conducted by, or be under the direction and personal supervision of a licensed tank tester. Certification information must be on file with the local Underground Storage Tank Program's regulatory agency. Underground tank testing methods are provided in Leak Detection in Underground Storage Tanks, NEESA 7-024A, December 1986 with updates.

**Table 2-2**  
**Spill Notification**

<b>Media Spill Occurs on</b>	<b>Quantity</b>	<b>Level of Response</b>
Soil	<10 gal >10 gal	Squadron Response Environmental Department
Drain	Any Amount	Environmental Department
Flight Line	<30 gal 30-100 gal >100 gal	Squadron Response Crash Crew Response Environmental Department
<b>RCRA WASTE</b>		
All	Any Spill	Notify Environmental Department



Each tank should be equipped with overfill protection, if it is not already installed. This should include spill containment basins, an automatic shut-off on the fill port, and ball float valves on the vent and vapor lines. Under NAVFAC DM-22, a high-level indicator should be installed in each tank, with a visible and/or audible high and low level alarm. The cathodically protected pipeline system at the Tank Farms must be inspected and maintained on a regular basis.

A warning light system or physical barriers should be provided at each of the loading/unloading areas to protect against departure of tank trucks before disconnection of the fuel hoses. The flexible fuel hoses should be stored on a rack under cover to reduce hose deterioration by the sun.

Stormwater and small surface spills should be directed to a collection sump and disposed of as hazardous waste if determined to be hazardous.

Tank facility personnel should be trained initially and every six months thereafter on spill prevention and control. On-site spill prevention equipment at each tank farm should be readily available and consist of the following:

- 5 bags absorbent material (50 lbs/bag)
- 10 sorbent brooms
- 1 broom
- 1 dust pan
- 2 shovels
- 2 empty 55-gallon DOT approved drums with rim-seal top
- safety shower/eye wash

Based on the age of many of these tanks, the probability of leakage from any of the tanks or their piping is increasing significantly. The potential costs of remediation should justify closure of tanks and replacement with new double-walled tank systems, upgrading the tanks to comply with all regulations, or installation of an internal lining. In particular the concrete tanks should be lined if usage is continued, in accordance with NAVFAC TS-0987 1, Lining System, Interior of Concrete Storage Tanks (for Petroleum Fuels). The tank closure, upgrading, or lining could be prioritized by age and proximity to the groundwater.

## **2.2 Day Tank No. 398**

The Day Tank No. 398 is located on the facility map (Figure 2-1) within map grid No. 0-8. This underground concrete tank provides a supply of JP-5 fuel to four hot fueling islands. Each fueling island has two aircraft fueling stations. Fuel transfer operations are accomplished by a direct pipeline from Tank Farm No. 555.

### **2.2.1 Storage**

The Day Tank holds 108,000 gallons of JP-5 fuel.

### **2.2.2 Transfer**

Fuel is delivered to the Day Tank by a direct underground pipeline from Tank Farm 555. Jet fuel lines lead from the Day Tank to the four fueling islands.

### **2.2.3      Spill Prediction**

Spillage may occur associated with a tank or piping leak, or during aircraft fueling operations. Depending on the rate of leakage, an underground leak in the tank or piping could be undetected for a significant period of time resulting in a loss of many thousands of gallons of fuel. A catastrophic loss of the entire contents of the tank is highly unlikely since it is located underground and cannot drain by gravity. If no pumping is occurring and a leak is detected in the pipeline, the maximum loss would be limited to the amount of fuel stored in the pipeline. An example of release due to undetected leakage in the piping occurred in August 1988. The underground release from the piping had already contaminated adjacent backfill soils, and groundwater. (See Section 1.3 for a discussion of the underground release from the JP-5 storage tank.) Additional spillage would have further degraded the soil and the groundwater in the vicinity of the tank or pipelines.

Potential spill sources at the hot fueling islands include overfilling of an aircraft or a hose rupture during fuel transfer. The largest spill that would occur during aircraft refueling is estimated to be approximately 100 gallons based on the time required to close shutoff valves.

### **2.2.4      Containment**

Currently there is no containment provided for the Day Tank or the fueling islands. Both areas are paved with asphalt to protect the soil from small surface spills.

### **2.2.5      Drainage Control**

The Day Tank area currently drains to the southwest to a catch basin located in the runway infield. If a surface spill occurs, it could be caught and collected in this catch basin. Liquids flow from the catch basin through the storm drain and ultimately in the sewer system, except during storm conditions, when the liquids flow off station.

### **2.2.6      Security**

The Day Tank is secured by a chain-link fence which is kept locked when unattended. Security personnel check the Day Tank and fueling islands as part of routine 24-hour patrols. The Day Tank and fueling island system lighting consists of overhead lighting which is part of the facility utility lighting system.

### **2.2.7      Administration**

The designated coordinator responsible for oil spill prevention at the Day Tank and hot fueling islands is the Supply Department. Day Tank area personnel check tank liquid levels, check operation of the liquid level indicator and overfill alarm, and provide general inspection. Maintenance is provided by the Facilities Management Department. Fuel delivery, transfer and inspection records are maintained by personnel administering the facility. The facility supervisor, the MCAS El Toro Crash Crew, and the MCAS El Toro OSOT are responsible for spills, as defined in Table 2-2. An On-Scene Operations Team will assist the MCAS Crash Crew for spill response actions.

### **2.2.8      Recommendations**

A UST Management Plan should be prepared to summarize routine operating procedures, testing and maintenance programs, and spill control measures. It is essential that this underground storage tank be maintained in accordance with current federal, state and local regulations. Current regulations require existing underground tanks be tested annually for integrity, be installed with corrosion protection, continuous pipeline leak detectors, and be maintained with daily inventory reconciliation records. New tank systems must be double-walled and equipped with continuous leak detection capabilities. As of January 1, 1990 the State of California requires that integrity tests be conducted by, or under the direction and personal supervision of a licensed tank tester. Certification information must be on file with the local Underground Storage Tank Program's regulatory agency. Underground tank testing methods are provided in Leak Detection in Underground Storage Tanks, NEESA 7-024A, December 1986 with updates. The tank should be equipped with a spill containment basin, an automatic shut-off on the fill port, and ball float valves on the vent and vapor lines.

Stormwater and small surface spills should be directed to a collection sump and disposed of as hazardous waste if determined to be hazardous. Containment structures should be installed around the hot fueling areas to contain a maximum anticipated release. A manually operated valve should be provided to release accumulated rainwater after it had been determined to be non-hazardous.

Tank facility personnel should be trained initially and every six months on spill prevention and control. On-site spill prevention equipment should be readily available consisting of the following:

- 5 bags of absorbent material (50 lbs/bag)
- 10 sorbent brooms
- 1 broom
- 1 dust pan
- 2 shovels
- 2 empty 55-gallon DOT-approved drums with rim-seal top
- safety shower/eye wash station

Based on the age of the tank, the probability of leakage from the tank or its piping is significant. The potential costs of remediation should justify the replacement of the tank with a new double-walled tank system or its upgrading to conform to current regulations.

### **2.3 Motor Vehicle Filling Stations**

Four filling stations are operated at MCAS El Toro. Two are commercial facilities (Buildings 651 and 637) for personnel automobiles, each dispensing three grades of gasoline from multiple pump islands. These are located on map grid Nos. 0-2 and M-8 on Figure 2-1. The other two facilities (Buildings 298 and 800) dispense fuel for government owned vehicles and are located on map grid No. U-7 and U-10.

### **2.3.1      Storage**

The four filling stations consist of underground gasoline and diesel storage tanks. Tanks 800A, 800B, and 800C are fiberglass tanks while the rest of the tanks are constructed of steel. Audible high-level alarms and cathodic protection are not employed at these facilities. These tanks are included in a tank testing program.

The main filling station (651) also dispenses fresh motor oil from two 500-gallon tanks.

### **2.3.2      Transfer**

Fuel is delivered to the filling stations by tank truck. The tank truck hose valving connects directly onto the fill port for each tank and is equipped with an automatic cutoff in the event of overfilling. Each tank is piped to a typical filling station dispenser.

The pump islands are raised and protected with crash posts to protect from collision with vehicles. Vapor control is required on each gasoline dispensing nozzle. The dispensing nozzles are shut-off and the pumps locked out during periods of nonoperation.

### **2.3.3      Spill Prediction**

A spill during tank truck fuel transfer could result in a spill of up to the equivalent of one tank truck compartment. Spillage occurring during fuel dispensing from a

pump into a vehicle/aircraft is not likely to exceed a maximum of a few gallons. An underground leak associated with a tank or its piping, if undetected, could result in a loss of thousands of gallons being released into the adjacent backfill and soil and, eventually, into the underlying groundwater.

#### **2.3.4      Containment**

The filling station tanks are single-walled and do not provide containment in the event of an underground leak. The underground tanks are not equipped with overfill protection. All areas are surfaced with concrete or asphaltic concrete to contain limited surface spillage from percolating into the underlying soil. In the event of a surface spill, spill control equipment could be obtained from the fire department or Environmental Department.

#### **2.3.5      Drainage Control**

Drainage from the filling stations' fueling areas goes directly to storm drain basins and into the storm drain system. Drainage of small spills inside filling station maintenance garages will be directed to small collection depression in the floors, from which the spilled material could be removed. Larger spills would exit the building and enter the storm drain system.

#### **2.3.6      Security**

Each filling station is activated by starter controls within a lockable operations building. The building is locked after regular working hours. Filling station lighting is adequate and consists of utility lamps and general area lighting.



### **2.3.7      Administration**

Spill prevention responsibilities at each of the filling stations are currently assigned to the head supervisor. Filling station personnel check tank fuel levels daily and perform general inspections. Maintenance is performed by the Facilities Management Department as necessary. Fuel delivery, transfer and inspection records are kept in the filling station office.

The On-Scene Operations Team and the MCAS El Toro Fire Department will response to spills as defined by Table 2-2.

### **2.3.8      Recommendations**

An UST Management Plan should be prepared to summarize routine operating procedures, testing and maintenance programs, and spill control measures. The underground storage tanks should be maintained in accordance with current federal, state and local regulations which require existing underground tanks to be tested annually for integrity, to be installed with corrosion protection, continuous pipeline leak detectors, and to be maintained with daily inventory reconciliation records. Double-walls and continuous leak detection capabilities must be provided on new tank systems. As of 1 January 1990, the State of California requires that integrity tests be conducted by, or under the direction and personal supervision of a licensed tank tester. The certification information must be on file with the local Underground Storage Tank Program's regulatory agency. Underground tank testing methods are provided in Leak Detection in Underground Storage Tanks, NEESA 7-024A, December 1986 with updates.

Each tank should be equipped with overfill protection, if it is not already installed. This should include spill containment basins, an automatic shut-off on the fill port, and ball float valves on the vent and vapor lines. A high-level indicator should be installed in each tank, with a visible and/or audible alarm.

A warning light system or physical barrier should be provided at each of the loading/unloading areas to protect against departure of the tank trucks before disconnection of the fuel hoses.

Stormwater and small surface spills should be directed to a collection sump and disposed of as hazardous waste if determined to be hazardous. Containment structures should be installed around the loading/unloading areas.

Tank facility personnel should be trained initially and every six months on spill prevention and control. On-site spill prevention equipment should be readily available at each filling station and consist of:

- 5 bags absorbent material (50 lbs/bag)
- 10 sorbent brooms
- 1 broom
- 1 dust pan
- 2 shovels
- 2 empty 55-gallon DOT-approved drums with rim-seal top
- safety shower/eye wash station

Based on the age of many of the tanks, the probability of leakage from any of the tanks or their piping is increasing significantly. The potential costs of

remediation should justify closure of tanks and replacement with new double-walled tank systems or upgrading the tanks to comply with all regulations. The tank closure or upgrading could be prioritized by age and proximity to the groundwater.

## **2.4 Test Cells**

There are three active test cells located in map grid Nos. N-9, N-10 and Q-11 on Figure 2-1. Four 10,000-gallon underground storage tanks supply fuel (JP-5) to these three test cells.

### **2.4.1 Storage**

The four test cell supply tanks have a 10,000-gallon capacity. Fuel from the aircraft being tested is sometimes used in place of the fuel originally supplied from these tanks. These steel underground tanks are not cathodically protected and are not equipped with liquid level indicators or overfill alarms. All five tanks were tested as part of a station-wide testing program and passed.

### **2.4.2 Transfer**

Fuel is delivered to these test cell tanks by tank truck. The tank truck hose valving connects directly onto the fill port for each tank. Overfilling is prevented by automatic shutoff devices in the tank truck hose valving.

### **2.4.3      Spill Prediction**

Spillage could occur due to a tank or piping leak, or during fuel transfer operations. Depending on the rate of leakage, an underground leak in the tank or piping could go undetected for a significant period of time resulting in a loss of many thousands of gallons of fuel. An underground leak from the tank or piping would contaminate adjacent backfill material and soils and, if large enough, eventually reach groundwater.

Spillage could result from overfilling or hose rupture during tank truck delivery producing a surface spill of up to the total volume of fuel within one tank truck compartment.

### **2.4.4      Containment**

Currently there is no containment provided for these tanks or piping. The area is not paved to protect the soil against small surface spills.

### **2.4.5      Drainage Control**

These areas currently drain to the southwest eventually reaching a catch basin in the storm drain system. The storm drain main drainage channels are directed through an oil/water separator and into the sanitary sewer.

#### **2.4.6      Security**

The site is secured by a locked chain-link fence. Starter controls for the fuel supplied to the test cells are located within the test cell and are locked after regular working hours. Security personnel check the tank areas during routine 24-hour patrol operations. The lighting in the vicinity of the tanks consists of overhead utility lighting.

#### **2.4.7      Administration**

Oil spill prevention responsibilities at the test cells are assigned to Third Marine Aircraft Wing personnel operating the facilities. Maintenance is performed by the Facilities Management Department as necessary. An On-Scene Operations Team (OSOT) will assist the MCAS El Toro Fire Department in responding to spills as defined in Table 2-2.

#### **2.4.8      Recommendations**

An UST Closure Plan should be prepared if any of the tanks are out of service permanently. It is essential that the underground storage tanks be closed in accordance with current federal, state and local regulations.

Stormwater and small surface spills should be directed to a collection sump and disposed of as hazardous waste if determined to be hazardous.

Personnel performing any activities requiring transfer of fluids from or to these tanks should be trained initially and every six months on spill prevention and

control. On-site spill prevention equipment should be readily available consisting of:

- 5 bags of absorbent material (50 lbs/bag)
- 10 sorbent brooms
- 1 broom
- 1 dust pan
- 2 shovels
- 2 empty 55-gallon DOT-approved drums with rim-seal top
- safety shower/eye wash

Based on the age of these tanks, the probability of leakage of residual materials from these tanks or associated piping is increasing significantly. The existing tanks should be either closed and replaced with a new double-walled tank system or upgraded to comply with all regulations.

## **2.5 Other Fuel Tanks**

Fourteen other fuel tanks containing diesel, gasoline, or No. 2 Fuel are located at MCAS El Toro.

### **2.5.1 Storage**

JP-5 is stored in two 30,000-gallon fiberglass underground tanks (Tanks T-A and T-B), four 2,000-gallon steel underground tanks (Tanks T-2, T-3, T-6, and T-7), one 1,000-gallon steel underground tank (Tank T-10), and one 30,000-gallon aboveground tank (Tank 862). Gasoline is stored in one 600-gallon steel

aboveground tank ((Tank 380B) and one 10,000-gallon fiberglass underground tank (Tank 797). Diesel is stored in one 10,000-gallon steel underground tank (Tank 380A), one 2,000-gallon steel underground tank (Tank 388D), and one 500-gallon steel underground tank (Tank 388E). No. 2 Fuel is stored in one 5,000-gallon steel underground tank (Tank 439A).

#### **2.5.2      Transfer**

Fuel is delivered to the various fuel tanks by tank truck.

#### **2.5.3      Spill Prediction**

Spillage may occur associated with a tank leak. Depending on the rate of leakage, an underground leak could be undetected for a significant period of time resulting in a loss of several hundred gallons. The underground leak would contaminate adjacent backfill material and soil, and if large enough, eventually reach groundwater.

Tanks T-A, T-B, T-6, T-7, and 797 have a leak detection system.

#### **2.5.4      Containment**

Tanks 380B, T-A, T-B, 380B, 797, and 862 have secondary containment.

### **2.5.5      Drainage Control**

The aboveground Tanks 380B and 862 are located on concrete bermed areas. In the event of stormwater accumulation within the bermed areas, the stormwater will be discharged to the storm drain if determined to be non-hazardous.

### **2.5.6      Security**

The area around Tanks T-A, T-B, T-3, 380A, 380B, 388D, 388E, and 862 is fenced. Security personnel patrol the Station as part of routine 24-hour patrols.

### **2.5.7      Administration**

The designated coordinator responsible for oil spill prevention for these tanks is the Supply Department. On-site personnel provide general inspection of the tank areas. Tank integrity testing is performed at the required intervals. Maintenance is provided by the Facilities Management Department. The MCAS El Toro Fire Department and MCAS El Toro OSOT are responsible for spill response actions associated with spills as defined in Table 2-2.

### **2.5.8      Recommendations**

All underground fuel storage tanks should be included in an UST Management Plan prepared to summarize routine operating procedures, testing and maintenance programs, and spill control measures for the MCAS El Toro. It is essential that the underground storage tanks be maintained in accordance with current federal, state and local regulations. Current regulations require existing



underground tanks to be tested annually for integrity; to be installed with corrosion protection, continuous pipeline leak detectors; and to be maintained with daily inventory reconciliation records. New tank systems must be double-walled and equipped with continuous leak detection capabilities. As of January 1, 1990, the State of California requires that integrity tests be conducted by, or under the direction and personal supervision of a licensed tank tester. Certification information must be on file with the local underground storage tank program's regulatory agency. Underground tank testing methods are presented in *Leak Detection in Underground Storage Tanks*, NEESA 7-024A, December 1986 with updates.

If the tanks are to remain active each should be equipped with overfill protection equipment. This should include spill containment basins, an automatic shut-off on the fill port, and ball float valves on the vent and vapor lines. A high-level indicator should be installed in each tank, with a visual and/or audio alarm.

A warning light system or physical barrier should be provided at each of the loading/unloading areas to protect against departure of the tank trucks before disconnection of the fuel hoses.

Stormwater and small surface spills should be directed to a collection sump and disposed of as hazardous waste.

On-site spill prevention equipment should be readily available and consist of absorbent material, broom, dust pan, shovel, empty 55-gallon DOT-approved drum with rim-seal top, safety shower/eye wash station, and appropriate personal protective clothing/equipment.

Based on the age of some of these tanks, the probability of leakage from the tanks or their piping is increasing significantly. The potential costs of remediation should justify closure of some of the tanks with replacement by a new double-walled tank system, or upgrading these tanks to comply with all regulations.

## **2.6 Waste Oil Tanks**

There are nine waste oil tanks and one waste JP-5 tank at MCAS El Toro.

### **2.6.1 Storage**

Waste JP-5 is stored in a 2,500-gallon fiberglass underground tank (Tank T-C). Waste oil is stored in one 2,000-gallon steel underground tank (Tank T-4), one 45,000-gallon concrete underground tank (Tank 191), two 50,000-gallon concrete underground tanks (Tanks 189 and 314B), two 500-gallon steel underground tanks (Tanks 625 and 651-7), one 300-gallon concrete underground tank (Tank 673B), and two 1,000-gallon fiberglass underground tanks (Tanks 800D and 800E). Tank 625 is scheduled for removal.

### **2.6.2 Transfer**

Waste oil is poured into the tank via the tank fill port. The tanks are pumped by a tank truck.

### **2.6.3      Spill Prediction**

Spillage may occur associated with a tank leak or during waste oil transfer operations. Depending on the rate of leakage, an underground leak could be undetected for a significant period of time resulting in a loss of several hundred gallons. The underground leak would contaminate adjacent backfill material and soil, and if large enough, eventually reach groundwater.

Tanks T-C, 800D, and 800E are double-walled tanks. Leaks from these tanks will be contained.

### **2.6.4      Containment**

Tanks T-C, 800D, and 800E have secondary containment. The rest of the tanks do not have secondary containment; therefore, an underground release would spread directly into the adjacent soil.

### **2.6.5      Drainage Control**

There is no specific drainage control established in the vicinity of these areas.

### **2.6.6      Security**

The area around Tanks T-C, 673B, 800D, and 800E is fenced. Security personnel patrol the station as part of routine 24-hour patrols.

### **2.6.7      Administration**

Personnel working in the vicinity of the tanks provide general inspection. Maintenance is provide by the Facilities Management Department. In the event of a spill, as defined in Table 2-2, the MCAS El Toro Fire Department and OSOT would be notified to respond to the spill.

### **2.6.8      Recommendations**

The waste oil storage tanks are classified as Underground Storage Tank (UST) and if they are to be kept in operation they should be maintained in accordance with current federal, state and local regulations which include the establishment of a testing and maintenance program and spill control measures. Current regulations require existing underground tanks be tested annually for integrity, be installed with corrosion protection, and be maintained along with inventory reconciliation records. New underground tank systems must be double-walled and equipped with continuous leak detection capabilities. As of January 1, 1990 the State of California requires that integrity tests be conducted by, or under the direction and personal supervision of a licensed tank tester. Certification information must be on file with the local underground storage tank program's regulatory agency. Underground tank testing methods are provided in Leak Detection in Underground Storage Tanks, NEESA 7-024A, December 1986 with updates.

Spill prevention equipment should be readily available at or near the tank locations and should consist of absorbent material, broom and dust pan, and 1

empty 55-gallon DOT-approved drum with rim-seal top, as well as appropriate personal protective clothing/equipment.

Based on the age and construction of these tanks (except Tanks T-C, 800D, and 800E), the probability of leakage from these tanks is increasing significantly. The potential costs of remediation should justify abandonment/closure of the tanks with replacement by a new double-walled tank or an aboveground tank or upgrading the tanks to comply with all regulations.

COMCABWEST intends to bring waste oil underground tanks out of service and replace them with aboveground tanks.

## **2.7 Hazardous Waste Storage Facility - Building 673T3**

Building 673T3 is the Hazardous Waste Storage Facility (HWSF) for MCAS El Toro and contains flammables, corrosives, reactives, toxics, and wastes containing PCBs in five separate bays. It is located within map grid No. P-12 on Figure 2-1.

### **2.7.1 Storage**

Various hazardous wastes used by MCAS El Toro are stored in Building 673T3. Most of the wastes received are stored in DOT-approved containers. The building is constructed of corrugated metal roof and siding on light gauge steel framing. The building has five bays separated by berms.

As drums are received, they are sorted by hazard classification and placed into the appropriate storage bays. Drums are stored on pallets with a maximum of

four drums per pallet. Four foot aisle spaces are designated to allow for inspection of the drums.

#### **2.7.2      Transfer**

Hazardous wastes are received at Building 673T3 and placed on wooden or metal pallets. The wastes are relogged and inspected prior to placement in one of the designated bays categorized by hazard classification. Transfer of the materials in and out of the storage area is accomplished by forklift.

#### **2.7.3      Spill Prediction**

The hazardous wastes are maintained in a covered and protected area until they are transferred out for disposal at an appropriate facility. Generally, the volume of waste generated at MCAS El Toro is large enough that hazardous wastes are picked up for disposal on a frequent basis which reduces the likelihood that a drum or other container will have sufficient time to corrode while in storage. In the event of leakage, potentially due to corrosion or rupture during handling, leakage is likely to be limited to a maximum of one drum. In the event that a drum is found to be leaking, the drum will be overpacked.

#### **2.7.4      Containment**

Any spill would be contained within the building berms. On-site spill control equipment includes an eyewash, safety shower, shovel, broom, and absorbent material.

A telephone and internal alarm system are available at the HWSF to obtain additional emergency support and alert personnel in the area in the event of a spill or other emergency.

#### **2.7.5      Drainage Control**

The storage area is provided with spill containment structures so that drainage is controlled.

#### **2.7.6      Security**

Building 673T3 is secured by a locking chain-link fence. The facility is inspected daily and is checked as part of routine 24-hour security patrols of the Station. The facility is equipped with a telephone, and an alarm system which is to be used in the event of an emergency.

#### **2.7.7      Administration**

The Environmental Department is designated as responsible for the operations at Building 673T3. Building 673T3 is inspected and maintained by Environmental Department personnel. Inspection records are maintained by Environmental Department. In the event of a spill, as defined on Table 2-2, the MCAS El Toro Fire Department, assisted by the On-Scene Operations Team has been designated to respond to the incident.

### **2.7.8 Recommendations**

The RCRA Part B permit for this facility should be reviewed to determine that the facility is operating in accordance with the permit requirements.

## **2.8 Hazardous Waste Accumulation Areas**

Twenty-seven hazardous waste accumulation areas were constructed at MCAS El Toro in 1987 to provide short-term storage (less than 90 days) for hazardous waste generated in the vicinity of the particular accumulation areas. Each accumulation area is maintained by a Hazardous Waste Coordinator in that area. These personnel have been trained on the storage and handling of hazardous wastes at regular intervals.

### **2.8.1 Storage**

Contents of the Hazardous Waste Accumulation Areas include oily rags, spray paint cans, hydraulic fluid, "speedy dry," contaminated oil, and paint thinners/solvents each in separately labeled and dated containers. Containers are labeled with an accumulation date and contents. These accumulation areas, in some cases, consist of a corrugated metal roof which overhangs a concrete slab to provide weather protection. Other accumulation areas which store dry materials consist only of sand bags surrounding the storage containers. Some accumulation areas include aboveground waste oil storage tanks installed within the containment area.



### **2.8.2      Transfer**

These hazardous waste accumulation areas are designed to store wastes for a period of less than 90 days within sealed DOT-approved drums (or, in some cases, waste oil in a tank). Hazardous Waste Coordinators make daily and weekly inspections of each area to inspect for compliance and to evaluate the current inventory. As a drum is filled or approaches the 90-day time limit, the coordinator notifies the Environmental Department for inspection. After passing inspection, the drum is picked up and transferred to Building 673T3 by Environmental Department personnel.

### **2.8.3      Spill Prediction**

Spills may occur during placement of the waste into the waste container. Generally it is expected that spills will be limited to a maximum of one drum.

### **2.8.4      Containment**

The accumulation areas are constructed with berms (or sandbags in the case of dry material accumulation areas) so that spillage is contained.

### **2.8.5      Drainage Control**

As described in Section 2.8.4, the accumulation areas are constructed so as to catch liquid spillage/leakage. Drainage outside the curbed areas leads to the ground and eventually to the storm drain system.

### **2.8.6      Security**

Some of the accumulation areas are fenced, but are generally not fenced. Due to the location of the accumulation areas being within the confines of the secured MCAS El Toro perimeter, these areas are not accessible to the general public and would, therefore, not require individual fencing. However, only the Hazardous Waste Coordinator or his alternate are to have access to these areas. Each accumulation area is maintained and checked daily by the Hazardous Waste Coordinator who is picked/selected from among the local facility personnel. Lighting for the accumulation areas consist of area utility lighting.

### **2.8.7      Administration**

The accumulation areas are maintained by a designated Hazardous Waste Coordinator who is responsible at each site for the weekly inspection and documentation of hazardous wastes received at that accumulation area. Inspection records are maintained for 3 years.

### **2.8.8      Recommendations**

A field survey of several of the accumulation sites indicated that their level of compliance with applicable regulations on hazardous waste accumulation areas is good. The administrators and operators are aware of the following:

1. Waste are shipped from the accumulation site within 90 days of the accumulation start date.

2. Generator ID and accumulation date are marked clearly on the container holding the hazardous waste.
3. During storage, containers are managed properly and inspected daily.
4. The Hazardous Waste Coordinator of the 90-day site receives proper training.
5. The site has the necessary equipment such as a radio or telephone, spill control, and fire extinguisher. This equipment is inspected weekly.
6. A secondary containment is employed which is capable of holding at least 10 percent of the total volume of the wastes stored or 110 percent of the largest container, whichever is greater.
7. Wastes are properly segregated.
8. Signs identifying the site and the hazards are conspicuously posted.
9. Ignition sources are eliminated before storing ignitable wastes in the site.
10. Necessary documents (inspection reports) are maintained on site.
11. The site is secured, and only the hazardous waste coordinator and/or his alternate have access to the site.
12. The site-specific contingency plan is available on-site.

Drums are kept sealed. Each of the accumulation areas is secured with fencing, is designated with appropriate signs, and is kept locked when not in use. The site maintains adequate spill control equipment, a site specific contingency plan

including names of persons to be contacted in an emergency, and necessary hazardous waste back-up documents.

## **2.9 Other Sources of Spills - Oil/Water Separators**

Oil/water separators are utilized throughout the Station associated with wash racks, steam cleaning racks and storm drain or sewer drainage control. The majority of these separators are used to remove floating products from the effluent and are pumped out regularly. They are also equipped with high-level alarm systems and manually operated valves which can be used to override the system.

Two oil/water separators are situated near the downstream end of Bee Canyon Wash and Agua Chinon Wash prior to all stormwater drainage being pumped to the sanitary sewer. Each consists of a weir to contain dry-weather flows, a pump which discharges to the sanitary sewer system and oil recovery equipment. Under Project ET-530M the system has been improved but still may not have sufficient capacity to remove all oil flowing along with the water in the event of heavy rain water runoff or other large source of flow.

Oil/water separators at local building sites or other base locations must be maintained so that they are able to handle the effluent at the various source locations. Facility personnel at the various source locations must be trained in proper operation and maintenance of the particular oil/water separator(s) so that a minimal amount of oil reaches the terminal oil/water separators.

**ATTACHMENT 1**

**40 CFR 112**

## ENVIRONMENTAL PROTECTION AGENCY REGULATIONS ON OIL POLLUTION PREVENTION

(40 CFR 112; 38 FR 34164, December 11, 1973; Amended by 39 FR 31602,  
August 29, 1974; 41 FR 12657, March 26, 1976)

### PART 112—OIL POLLUTION PREVENTION Non-transportation Related Onshore and Offshore Facilities

**AUTHORITY:** Secs. 311(j)(1)(C), 311(j)(2), 501(a), Federal Water Pollution Control Act (Sen. 2, Pub. L. 92-500, 86 Stat. 818 et seq. (33 U.S.C. 1251 et seq.)); Sec. 4(b), Pub. L. 92-500, 86 Stat. 897; 5 U.S.C. Reorg. Plan of 1970 No. 3 (1970), 35 FR 15623, 3 CFR 1966-1970 Comp.; E.O. 11735, 38 FR 21243, 3 CFR.

#### § 112.1 General applicability.

(a) This part establishes procedures, methods and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States or adjoining shorelines.

(b) Except as provided in paragraph (d) of this section, this part applies to owners or operators of non-transportation-related onshore and offshore facilities engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing or consuming oil and oil products, and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in Part 110 of this chapter, into or upon the navigable waters of the United States or adjoining shorelines.

(c) As provided in sec. 313 (86 Stat. 875) departments, agencies, and instrumentalities of the Federal government are subject to these regulations to the same extent as any person, except for the provisions of § 112.6.

(d) This part does not apply to:

(1) Facilities, equipment or operations which are not subject to the jurisdiction of the Environmental Protection Agency, as follows:

(A) onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines. This determination shall be based solely upon a consideration of the geographical, locational aspects of the facility (such as proximity to navigable waters or adjoining shorelines, land contour, drainage, etc.) and shall exclude consideration of manmade features such as dikes, equipment or other structures which may serve to restrain, hinder, contain, or otherwise prevent a discharge of oil from reaching navigable waters of the United States or adjoining shorelines; and

(B) equipment or operations of vessels or transportation-related onshore and offshore facilities which are subject to authority and control of the Department of Transportation, as defined in the Memorandum of Understanding between the Secretary of Transportation and the Administrator of the Environmental Protection Agency, dated November 24, 1971, 36 FR 24000.

(2) those facilities which, although otherwise subject to the jurisdiction of the Environmental Protection Agency, meet both of the following requirements:

(A) the underground buried storage capacity of the facility is 42,000 gallons or less of oil, and

(B) the storage capacity, which is not buried, of the facility is 1,320 gallons or less of oil, provided no single container has a capacity in excess of 660 gallons.

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(e) This part provides for the preparation and implementation of Spill Prevention Control and Countermeasure Plans prepared in accordance with § 112.7, designed to complement existing laws, regulations, rules, standards, policies and procedures pertaining to safety standards, fire prevention and pollution prevention rules, so as to form a comprehensive balanced Federal/State spill prevention program to minimize the potential for oil discharges. Compliance with this part does not in any way relieve the owner or operator of an onshore or an offshore facility from compliance with other Federal, State or local laws.

#### § 112.2 Definitions.

For the purposes of this part:

(a) "Oil" means oil of any kind or in any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse and oil mixed with wastes other than dredged spoil.

(b) "Discharge" includes but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying or dumping. For purposes of this part, the term "discharge" shall not include any discharge of oil which is authorized by a permit issued pursuant to Section 13 of the River and Harbor Act of 1899 (30 Stat. 1121, 33 U.S.C. 407), or Sections 402 or 405 of the FWPCA Amendments of 1972 (86 Stat. 816 et seq., 33 U.S.C. 1251 et seq.).

(c) "Onshore facility" means any facility of any kind located in, on, or

under any land within the United States, other than submerged lands, which is not a transportation-related facility.

(d) "Offshore facility" means any facility of any kind located in, on, or under any of the navigable waters of the United States, which is not a transportation-related facility.

(e) "Owner or operator" means any person owning or operating an onshore facility or an offshore facility, and in the case of any abandoned offshore facility, the person who owned or operated such facility immediately prior to such abandonment.

(f) "Person" includes an individual, firm, corporation, association, and a partnership.

(g) "Regional Administrator" means the Regional Administrator of the Environmental Protection Agency, or his designee, in and for the Region in which the facility is located.

(h) "Transportation-related" and "non-transportation-related" as applied to an onshore or offshore facility, are defined in the Memorandum of Understanding between the Secretary of Transportation and the Administrator of the Environmental Protection Agency, dated November 24, 1971, 36 FR 24080.

(i) "Spill event" means a discharge of oil into or upon the navigable waters of the United States or adjoining shorelines in harmful quantities, as defined in 40 CFR Part 110.

(j) "United States" means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Canal Zone, Guam, American Samoa, the Virgin Islands, and the Trust Territory of the Pacific Islands.

(k) The term "navigable waters" of the United States means "navigable waters" as defined in section 302(7) of the FWPCA, and includes:

(1) all navigable waters of the United States, as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA (Pub. L. 92-500), and tributaries of such waters;

(2) interstate waters;

(3) intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and

(4) intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce.

(l) "Vessel" means every description of watercraft or other artificial contriv-

ance used, or capable of being used as a means of transportation on water, other than a public vessel.

### 112.3 Requirements for preparation and implementation of Spill Prevention Control and Countermeasure Plans.

(a) Owners or operators of onshore and offshore facilities in operation on or before the effective date of this part that have discharged or, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines, shall prepare a Spill Prevention Control and Countermeasure Plan (hereinafter "SPCC Plan"), in writing and in accordance with section 112.7. Except as provided for in paragraph (f) of this section, such SPCC Plan shall be prepared within six months after the effective date of this part and shall be fully implemented as soon as possible, but not later than one year after the effective date of this part.

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(b) Owners or operators of onshore and offshore facilities that become operational after the effective date of this part, and that have discharged or could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines, shall prepare an SPCC Plan in accordance with § 112.7. Except as provided for in paragraph (f) of this section, such SPCC Plan shall be prepared within six months after the date such facility begins operations and shall be fully implemented as soon as possible, but not later than one year after such facility begins operations.

(c) Owners or operators of onshore and offshore mobile or portable facilities, such as onshore drilling or workover rigs, barge mounted offshore drilling or workover rigs, and portable fueling facilities shall prepare and implement an SPCC Plan as required by paragraphs (a), (b) and (d) of this section. The owners or operators of such facility need not prepare a new SPCC Plan each time the facility is moved to a new site. The SPCC Plan may be a general plan, prepared in accordance with section 112.7, using good engineering practice. When the mobile or portable facility is moved, it must be located and installed using the spill prevention practices outlined in the SPCC Plan for the facility. No mobile or portable facility subject to this regulation shall operate unless the SPCC Plan has been implemented. The SPCC Plan shall only apply while the facility is in a fixed (non-transportation) operating mode.

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(d) No SPCC Plan shall be effective to satisfy the requirements of this part unless it has been reviewed by a Registered Professional Engineer and certified to by such Professional Engineer. By means of this certification the engineer, having examined the facility and being familiar with the provisions of this part, shall attest that the SPCC Plan has been prepared in accordance with good

engineering practices. Such certification shall in no way relieve the owner or operator of an onshore or offshore facility of his duty to prepare and fully implement such Plan in accordance with § 112.7, as required by paragraphs (a), (b) and (c) of this section.

(e) Owners or operators of a facility for which an SPCC Plan is required pursuant to paragraphs (a), (b) or (c) of this section shall maintain a complete copy of the Plan at such facility if the facility is normally attended at least 8 hours per day, or at the nearest field office if the facility is not so attended, and shall make such Plan available to the Regional Administrator for on-site review during normal working hours.

(f) Extensions of time.

(1) The Regional Administrator may authorize an extension of time for the preparation and full implementation of an SPCC Plan beyond the time permitted for the preparation and implementation of an SPCC Plan pursuant to paragraphs (a), (b) or (c) of this section where he finds that the owner or operator of a facility subject to paragraphs (a), (b) or (c) of this section cannot fully comply with the requirements of this part as a result of either nonavailability of qualified personnel, or delays in construction or equipment delivery beyond the control and without the fault of such owner or operator or their respective agents or employees.

(2) Any owner or operator seeking an extension of time pursuant to paragraph (f) (1) of this section may submit a letter of request to the Regional Administrator. Such letter shall include:

(i) A complete copy of the SPCC Plan, if completed;

(ii) A full explanation of the cause for any such delay and the specific aspects of the SPCC Plan affected by the delay;

(iii) A full discussion of actions being taken or contemplated to minimize or mitigate such delay;

(iv) A proposed time schedule for the implementation of any corrective actions being taken or contemplated, including interim dates for completion of tests or studies, installation and operation of any necessary equipment or other preventive measures.

In addition, such owner or operator may present additional oral or written statements in support of his letter of request.

(3) The submission of a letter of request for extension of time pursuant to paragraph (f) (2) of this section shall in no way relieve the owner or operator from his obligation to comply with the requirements of § 112.3 (a), (b) or (c). Where an extension of time is authorized by the Regional Administrator for particular equipment or other specific aspects of the SPCC Plan, such extension shall in no way affect the owner's or operator's obligation to comply with the requirements of § 112.3 (a), (b) or (c) with respect to other equipment or other specific aspects of the SPCC Plan for which an extension of time has not been expressly authorized.

### § 112.4 Amendment of SPCC Plans by Regional Administrator.

(a) Notwithstanding compliance with § 112.3, whenever a facility subject to § 112.3 (a), (b) or (c) has: Discharged more than 1,000 U.S. gallons of oil into or upon the navigable waters of the United States or adjoining shorelines in a single spill event, or discharge; oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines in two spill events, reportable under section 311(b) (5) of the FWPCA, occurring within any twelve month period, the owner or operator of such facility shall submit to the Regional Administrator, within 60 days from the time such facility becomes subject to this section, the following:

(1) Name of the facility;

(2) Name(s) of the owner or operator of the facility;

(3) Location of the facility;

(4) Date and year of initial facility operation;

(5) Maximum storage or handling capacity of the facility and normal daily throughput;

(6) Description of the facility, including maps, flow diagrams, and topographical maps;

(7) A complete copy of the SPCC Plan with any amendments;

(8) The cause(s) of such spill, including a failure analysis of system or subsystem in which the failure occurred;

(9) The corrective actions and/or countermeasures taken, including an adequate description of equipment repairs and/or replacements;

(10) Additional preventive measures taken or contemplated to minimize the possibility of recurrence;

(11) Such other information as the Regional Administrator may reasonably require pertinent to the Plan or spill event.

(b) Section 112.4 shall not apply until the expiration of the time permitted for the preparation and implementation of an SPCC Plan pursuant to § 112.3 (a), (b), (c) and (f).

(c) A complete copy of all information provided to the Regional Administrator pursuant to paragraph (a) of this section shall be sent at the same time to the State agency in charge of water pollution control activities in and for the State in which the facility is located. Upon receipt of such information such State agency may conduct a review and make recommendations to the Regional Administrator as to further procedures, methods, equipment and other requirements for equipment necessary to prevent and to contain discharges of oil from such facility.

(d) After review of the SPCC Plan for a facility subject to paragraph (a) of this section, together with all other information submitted by the owner or operator of such facility, and by the State agency under paragraph (c) of this section, the Regional Administrator may require the owner or operator of such facility to amend the SPCC Plan if he finds that the Plan does not meet the requirements of this part or that the amendment of the Plan is neces-

sary to prevent and to contain discharges of oil from such facility.

(e) When the Regional Administrator proposes to require an amendment to the SPCC Plan, he shall notify the facility operator by certified mail addressed to, or by personal delivery to, the facility owner or operator, that he proposes to require an amendment to the Plan, and shall specify the terms of such amendment. If the facility owner or operator is a corporation, a copy of such notice shall also be mailed to the registered agent, if any, of such corporation in the State where such facility is located. Within 30 days from receipt of such notice, the facility owner or operator may submit written information, views, and arguments on the amendment. After considering all relevant material presented, the Regional Administrator shall notify the facility owner or operator of any amendment required or shall rescind the notice. The amendment required by the Regional Administrator shall become part of the Plan 30 days after such notice, unless the Regional Administrator, for good cause, shall specify another effective date. The owner or operator of the facility shall implement the amendment of the Plan as soon as possible, but not later than six months after the amendment becomes part of the Plan, unless the Regional Administrator specifies another date.

(f) An owner or operator may appeal a decision made by the Regional Administrator requiring an amendment to an SPCC Plan. The appeal shall be made to the Administrator of the United States Environmental Protection Agency and must be made in writing within 30 days of receipt of the notice from the Regional Administrator requiring the amendment. A complete copy of the appeal must be sent to the Regional Administrator at the time the appeal is made. The appeal shall contain a clear and concise statement of the issues and points of fact in the case. It may also contain additional information from the owner or operator, or from any other person. The Administrator or his designee may request additional information from the owner or operator, or from any other person. The Administrator or his designee shall render a decision within 60 days of receiving the appeal and shall notify the owner or operator of his decision.

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#### § 112.5 Amendment of Spill Prevention Control and Countermeasure Plans by owners or operators.

(a) Owners or operators of facilities subject to § 112.3 (a), (b) or (c) shall amend the SPCC Plan for such facility in accordance with § 112.7 whenever there is a change in facility design, construction, operation or maintenance which materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. Such amendments shall be fully implemented as soon as possible, but not later than six months after such change occurs.

(b) Notwithstanding compliance with paragraph (a) of this section, owners

and operators of facilities subject to § 112.3 (a), (b) or (c) shall complete a review and evaluation of the SPCC Plan at least once every three years from the date such facility becomes subject to this part. As a result of this review and evaluation, the owner or operator shall amend the SPCC Plan within six months of the review to include more effective prevention and control technology if:

- (1) Such technology will significantly reduce the likelihood of a spill event from the facility, and
- (2) If such technology has been field-proven at the time of the review.

(c) No amendment to an SPCC Plan shall be effective to satisfy the requirements of this section unless it has been certified by a Professional Engineer in accordance with § 112.3(d).

#### § 112.6 Civil penalties for violation of Oil Pollution Prevention Regulations.

Owners or operators of facilities subject to § 112.3(a), (b) or (c) who violate the requirements of this Part 112 by failing or refusing to comply with any of the provisions of § 112.3, § 112.4 or § 112.5 shall be liable for a civil penalty of not more than \$5,000 for each day such violation continues. Civil penalties shall be imposed in accordance with procedures set out in Part 114 of this subchapter D.

#### § 112.7 Guidelines for the preparation and implementation of a Spill Prevention Control and Countermeasure Plan.

The SPCC Plan shall be a carefully thought-out plan, prepared in accordance with good engineering practices, and which has the full approval of management at a level with authority to commit the necessary resources. If the plan calls for additional facilities or procedures, methods, or equipment not yet fully operational, these items should be discussed in separate paragraphs, and the details of installation and operational start-up should be explained separately. The complete SPCC Plan shall follow the sequence outlined below, and include a discussion of the facility's conformance with the appropriate guidelines listed:

(a) A facility which has experienced one or more spill events within twelve months prior to the effective date of this part should include a written description of each such spill, corrective action taken and plans for preventing recurrence.

(b) Where experience indicates a reasonable potential for equipment failure (such as tank overflow, rupture, or leakage), the plan should include a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each major type of failure.

(c) Appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course should be provided. One of the following preventive

systems or its combination should be used as a minimum:

#### (1) Onshore facilities.

(i) *Oil storage tanks or vessels* sufficiently impervious to contain spilled oil.

#### (ii) Curbing

(iii) *Collecting* *drainage systems*

(iv) *Weirs, booms or other barriers*

(v) *Spill diversion ponds*

(vi) *Retention ponds*

(vii) *Sorbent materials*

(2) *Offshore facilities.*

(i) *Curbing, drip pans*

(ii) *Sumps and collection systems*

(d) When it is determined that the installation of structures or equipment listed in § 112.7(e) to prevent discharge of oil from reaching the navigable waters is not practicable from any facility, offshore facilities the owner or operator should clearly demonstrate such impracticability and provide the following:

(1) A strong oil spill containment plan following the provision of 40 CFR Part 100.

(2) A written commitment of manpower, equipment and materials required to expeditiously control and remove any harmful quantity of oil discharged.

(e) In addition to the minimum prevention standards listed under § 112.7(e), sections of the Plan should include a complete discussion of conformance with the following applicable guidelines: other effective spill prevention and containment procedures (or, if more stringent, with State rules, regulations and guidelines):

(1) *Facility drainage (onshore):* (excluding production facilities). (i) Drainage from diked storage areas should be restrained by valves or other positive means to prevent a spill or other excessive leakage of oil into the drainage system or inplant effluent treatment system, except where plan systems are designed to handle such leakage. Other areas may be emptied by pumps or elevators; however, these should be manually activated and the condition of the accumulation should be examined before starting to be sure no oil will be discharged into the water.

(ii) Flapper-type drain valves should not be used to drain diked areas. Valves used for the drainage of diked areas should, as far as practical, be of manual, open-and-closed design. When plant drainage drains directly into water courses and not into wastewater treatment plants, retained storm water should be inspected as provided in paragraph (e) (2) (iii) (B, C and D) before drainage.

(iii) Plant drainage systems from undiked areas should, if possible, flow into ponds, lagoons or catchment basins, designed to retain oil or return it to the facility. Catchment basins should not be located in areas subject to periodic flooding.

(iv) If plant drainage is not engineered as above, the final discharge of all in-plant ditches should be equipped with a diversion system that could, in



the event of an uncontrolled spill, return the oil to the plant.

(v) Where drainage waters are treated in more than one treatment unit, natural hydraulic flow should be used. If pump transfer is needed, two "lift" pumps should be provided, and at least one of the pumps should be permanently installed when such treatment is continuous. In any event, whatever techniques are used facility drainage systems should be adequately engineered to prevent oil from reaching navigable waters in the event of equipment failure or human error at the facility.

(2) Bulk storage tanks (onshore); (excluding production facilities). (i) No tank should be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature, etc.

(ii) All bulk storage tank installations should be constructed so that a secondary means of containment is provided for the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation. Diked areas should be sufficiently impervious to contain spilled oil. Dikes, containment curbs, and pits are commonly employed for this purpose, but they may not always be appropriate. An alternative system could consist of a complete drainage trench enclosure arranged so that a spill could terminate and be safely confined in an in-plant catchment basin or holding pond.

(iii) Drainage of rainwater from the diked area into a storm drain or an effluent discharge that empties into an open water course, lake, or pond, and bypassing the in-plant treatment system may be acceptable if:

(A) The bypass valve is normally sealed closed.

(B) Inspection of the run-off rain water ensures compliance with applicable water quality standards and will not cause a harmful discharge as defined in 40 CFR 110.

(C) The bypass valve is opened, and released following drainage under responsible supervision.

(D) Adequate records are kept of such events.

(iv) Buried metallic storage tanks represent a potential for undetected spills. A new buried installation should be protected from corrosion by coatings, cathodic protection or other effective methods compatible with local soil conditions. Such buried tanks should at least be subjected to regular pressure testing.

(v) Partially buried metallic tanks for the storage of oil should be avoided, unless the buried section of the shell is adequately coated, since partial burial in damp earth can cause rapid corrosion of metallic surfaces, especially at the earth/air interface.

(vi) Aboveground tanks should be subject to periodic integrity testing, taking into account tank design (floating roof, etc.) and using such techniques as hydrostatic testing, visual inspection or a system of non-destructive snell thickness testing. Comparison records should be kept where appropriate, and tank supports and foundations should be included in these inspections. In addition, the outside of the tank should frequently be observed by operating personnel for signs of deterioration, leaks which might cause a spill, or accumulation of oil inside diked areas.

(vii) To control leakage through defective internal heating coils, the following factors should be considered and applied, as appropriate.

(A) The steam return or exhaust lines from internal heating coils which discharge into an open water course should be monitored for contamination, or passed through a settling tank, skimmer, or other separation or retention system.

(B) The feasibility of installing an external heating system should also be considered.

(viii) New and old tank installations should, as far as practical, be fail-safe engineered or updated into a fail-safe engineered installation to avoid spills. Consideration should be given to providing one or more of the following devices:

(A) High liquid level alarms with an audible or visual signal at a constantly manned operation or surveillance station; in smaller plants an audible air vent may suffice.

(B) Considering size and complexity of the facility, high liquid level pump cutoff devices set to stop flow at a predetermined tank content level.

(C) Direct audible or code signal communication between the tank gauger and the pumping station.

(D) A fast response system for determining the liquid level of each bulk storage tank such as digital computers, telepulse, or direct vision gauges or their equivalent.

(E) Liquid level sensing devices should be regularly tested to insure proper operation.

(ix) Plant effluents which are discharged into navigable waters should have disposal facilities observed frequently enough to detect possible system upsets that could cause an oil spill event.

(x) Visible oil leaks which result in a loss of oil from tank seams, gaskets, rivets and bolts sufficiently large to cause the accumulation of oil in diked areas should be promptly corrected.

(xi) Mobile or portable oil storage tanks (onshore) should be positioned or located so as to prevent spilled oil from reaching navigable waters. A secondary means of containment, such as dikes or catchment basins, should be furnished for the largest single compartment or tank. These facilities should be located where they will not be subject to periodic flooding or washout.

(3) Facility transfer operations, pumping, and in-plant process (onshore); (excluding production facilities). (i) Buried piping installations should have a protective wrapping and coating and should be cathodically protected if soil conditions warrant. If a section of buried line is exposed for any reason, it should be carefully examined for deterioration. If corrosion damage is found, additional examination and corrective action should be taken as indicated by the magnitude of the damage. An alternative would be the more frequent use of exposed pipe corridors or galleries.

(ii) When a pipeline is not in service, or in standby service for an extended time the terminal connection at the transfer point should be capped or blank-flanged, and marked as to origin.

(iii) Pipe supports should be properly designed to minimize abrasion and corrosion and allow for expansion and contraction.

(iv) All aboveground valves and pipelines should be subjected to regular examinations by operating personnel at which time the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces should be assessed. In addition, periodic pressure testing may be warranted for piping in areas where facility drainage is such that a failure might lead to a spill event.

(v) Vehicular traffic granted entry into the facility should be warned verbally or by appropriate signs to be sure that the vehicle, because of its size, will not endanger above ground piping.

(4) Facility tank car and tank truck loading/unloading rack (onshore). (i) Tank car and tank truck loading/unloading procedures should meet the minimum requirements and regulation established by the Department of Transportation.

(ii) Where rack area drainage does not flow into a catchment basin or treatment facility designed to handle spills, a quick drainage system should be used for tank truck loading and unloading areas. The containment system should be designed to hold at least maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded in the plant.

(iii) An interlocked warning light or physical barrier system, or warning signs, should be provided in loading/unloading areas to prevent vehicular departure before complete disconnect of flexible or fixed transfer lines.

(iv) Prior to filling and departure of any tank car or tank truck, the lowermost drain and all outlets of such vehicles should be closely examined for leakage, and if necessary, tightened, adjusted, or replaced to prevent liquid leakage while in transit.

(5) Oil production facilities (onshore). (i) Definition. An onshore production facility may include all wells, flowlines, separation equipment, storage facilities, gathering lines, and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

(ii) Oil production facility (onshore) drainage. (A) At tank batteries and central treating stations where an accidental discharge of oil would have a reasonable possibility of reaching navigable waters, the dikes or equivalent required under § 112.7(c)(1) should have drains closed and sealed at all times except when rainwater is being drained. Prior to drainage, the diked area should be inspected as provided in paragraph (e)(2)(iii)(B), (C), and (D). Accumulated oil on the rainwater should be picked up and returned to storage or disposed of in accordance with approved methods.

(B) Field drainage ditches, road ditches, and oil traps, sumps or skimmers, if such exist, should be inspected at regularly scheduled intervals for accumulation of oil that may have escaped from small leaks. Any such accumulations should be removed.

(iii) Oil production facility (onshore) bulk storage tanks. (A) No tank should be used for the storage of oil unless its material and construction are compatible with the material stored and the conditions of storage.

(B) All tank battery and central treating plant installations should be provided with a secondary means of containment for the entire contents of the largest single tank if feasible, or alternate systems such as those outlined in § 112.7(c)(1). Drainage from undiked areas should be safely confined in a catchment basin or holding pond.

(C) All tanks containing oil should be visually examined by a competent person for condition and need for maintenance on a scheduled periodic basis. Such examination should include the foundation and supports of tanks that are above the surface of the ground.

(D) New and old tank battery installations should, as far as practical, be fail-safe engineered or updated into a fail-safe engineered installation to prevent spills. Consideration should be given to one or more of the following:

(1) Adequate tank capacity to assure that a tank will not overflow should a pumper/gauger be delayed in making his regular rounds.

(2) Overflow equalizing lines between tanks so that a full tank can overflow to an adjacent tank.

(3) Adequate vacuum protection to prevent tank collapse during a pipeline run.

(4) High level sensors to generate and transmit an alarm signal to the computer where facilities are a part of a computer production control system.

(iv) *Facility transfer operations, oil production facility (onshore).* (A) All above ground valves and pipelines should be examined periodically on a scheduled basis for general condition of items such as flange joints, valve glands and bodies, drip pans, pipeline supports, pumping well polish rod stuffing boxes, bleeder and gauge valves.

(B) Salt water (oil field brine) disposal facilities should be examined often, particularly following a sudden change in atmospheric temperature to detect possible system upsets that could cause an oil discharge.

(C) Production facilities should have a program of flowline maintenance to prevent spills from this source. The program should include periodic examinations, corrosion protection, flowline replacement, and adequate records, as appropriate, for the individual facility.

(B) *Oil drilling and workover facilities (onshore)* (i) Mobile drilling or workover equipment should be positioned or located so as to prevent spilled oil from reaching navigable waters.

(ii) Depending on the location, catchment basins or diversion structures may be necessary to intercept and contain spills of fuel, crude oil, or oily drilling fluids.

(iii) Before drilling below any casing string or during workover operations, a blowout prevention (BOP) assembly and well control system should be installed that is capable of controlling any well head pressure that is expected to be encountered while that BOP assembly is on the well. Casing and BOP installations should be in accordance with State regulatory agency requirements.

(7) *Oil drilling, production, or workover facilities (offshore).* (i) Definition: "An oil drilling, production or workover facility (offshore)" may include all drilling or workover equipment, wells, flowlines, gathering lines, platforms and auxiliary nontransportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

(ii) Oil drainage collection equipment should be used to prevent and control small oil spillage around pumps, glands, valves, flanges, expansion joints, hoses, drain lines, separators, treaters, tanks, and allied equipment. Drains on the facility should be controlled and directed toward a central collection sump or equivalent collection system sufficient to prevent discharges of oil into the navigable waters of the United States. Where drains and sumps are not practicable oil contained in collection equipment should be removed as often as necessary to prevent overflow.

(iii) For facilities employing a sump system, sump and drains should be adequately sized and a spare pump or equivalent method should be available to remove liquid from the sump and assure that oil does not escape. A regular scheduled preventive maintenance inspection and testing program should be employed to assure reliable operation of the liquid removal system and pump start-up device. Redundant automatic sump pumps and control devices may be required on some installations.

(iv) In areas where separators and treaters are equipped with dump valves whose predominant mode of failure is in the closed position and pollution risk is high, the facility should be specially equipped to prevent the escape of oil. This could be accomplished by extending the flare line to a diked area if the separator is near shore, equipping it with a high liquid level sensor that will automatically shut-in wells producing to the separator, parallel redundant dump valves, or other feasible alternatives to prevent oil discharges.

(v) Atmospheric storage or surge tanks should be equipped with high liquid level sensing devices or other acceptable alternatives to prevent oil discharges.

(vi) Pressure tanks should be equipped with high and low pressure sensing devices to activate an alarm and/or control the flow or other acceptable alternatives to prevent oil discharges.

(vii) Tanks should be equipped with suitable corrosion protection.

(viii) A written procedure for inspecting and testing pollution prevention equipment and systems should be prepared and maintained at the facility. Such procedures should be included as part of the SPCC Plan.

(ix) Testing and inspection of the pollution prevention equipment and systems at the facility should be conducted by the owner or operator on a scheduled periodic basis commensurate with the complexity, conditions and circumstances of the facility or other appropriate regulations.

(x) *Surface and subsurface well shut-in valves and devices in use at the facility should be continuously monitored to determine method of activation or control, e.g., pressure differential, change in fluid or flow conditions, mechanical pressure and flow manual or remote control mechanisms. Detailed records for each well while not necessary, the plan should be kept by the owner or operator.*

(xi) Before drilling below any casing string, and during workover operations, a blowout preventer (BOP) assembly and well control system should be installed that is capable of controlling any well head pressure that is expected to be encountered while that BOP assembly is on the well. Casing and BOP installations should be in accordance with State regulatory agency requirements.

(xii) Extraordinary well control measures should be provided should emergency conditions, including fire, loss of control and other abnormal conditions occur. The degree of control system redundancy should vary with hazard exposure and probable consequences of failure. It is recommended that surface shut-in systems have redundant or "fail close" valving. Subsurface safety valves may not be needed in producing wells that will not flow but should be installed as required by applicable State regulations.

(xiii) In order that there will be no misunderstanding of joint and separate duties and obligations to perform work in a safe and pollution free manner, written instructions should be prepared by the owner or operator for contractors and subcontractors to follow whenever contract activities include servicing a well or systems appurtenant to a well or pressure vessel. Such instructions and procedures should be maintained at the offshore production facility. Under certain circumstances and conditions such contractor activities may require the presence at the facility of an authorized representative of the owner or operator who would intervene when necessary to prevent a spill event.

(xiv) All manifolds (headers) should be equipped with check valves on individual flowlines.

(xv) If the shut-in well pressure is greater than the working pressure of the flowline and manifold valves up to and including the header valves associated with that individual flowline, the flowline should be equipped with a high pressure sensing device and shut-in valve at the wellhead unless provided with a pressure relief system to prevent overpressuring.

(xvi) All pipelines appurtenant to the facility should be protected from corrosion. Methods used, such as protective coatings or cathodic protection, should be discussed.

(xvii) Sub-marine pipelines appurtenant to the facility should be adequately protected against environmental stresses and other activities such as fishing operations.

(xviii) Sub-marine pipelines appurtenant to the facility should be in good

operating condition at all times and inspected on a scheduled periodic basis for failures. Such inspections should be documented and maintained at the facility.

(8) *Inspections and records.* Inspections required by this part should be in accordance with written procedures developed for the facility by the owner or operator. These written procedures and a record of the inspections, signed by the appropriate supervisor or inspector, should be made part of the SPCC Plan and maintained for a period of three years.

(9) *Security (excluding oil production facilities).* (i) All plants handling, processing, and storing oil should be fully fenced, and entrance gates should be locked and/or guarded when the plant is not in production or is unattended.

(ii) The master flow and drain valves and any other valves that will permit direct outward flow of the tank's content to the surface should be securely locked in the closed position when in non-operating or non-standby status.

(iii) The starter control on all oil pumps should be locked in the "off" position or located at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.

(iv) The loading/unloading connections of oil pipelines should be securely capped or blank-flanged when not in service or standby service for an extended time. This security practice should also apply to pipelines that are emptied of liquid content either by 'raining or by inert gas pressure.

(v) Facility lighting should be commensurate with the type and location of the facility. Consideration should be given to: (A) Discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.) and (B) prevention of spills occurring through acts of vandalism.

(10) *Personnel, training and spill prevention procedures.* (i) Owners or operators are responsible for properly instructing their personnel in the operation and maintenance of equipment to prevent the discharges of oil and applicable pollution control laws, rules and regulations.

(ii) Each applicable facility should have a designated person who is accountable for oil spill prevention and who reports to line management.

(iii) Owners or operators should schedule and conduct spill prevention briefings for their operating personnel at intervals frequent enough to assure adequate understanding of the SPCC Plan for that facility. Such briefings

should highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

#### APPENDIX

Memorandum of Understanding between the Secretary of Transportation and the Administrator of the Environmental Protection Agency.

#### SECTION II—DEFINITIONS

The Environmental Protection Agency and the Department of Transportation agree that for the purposes of Executive Order 11848, the term:

(1) "Non-transportation-related onshore and offshore facilities" means:

(A) Fixed onshore and offshore oil well drilling facilities including all equipment and appurtenances related thereto used in drilling operations for exploratory or development wells, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(B) Mobile onshore and offshore oil well drilling platforms, barges, trucks, or other mobile facilities including all equipment and appurtenances related thereto when such mobile facilities are fixed in position for the purpose of drilling operations for exploratory or development wells, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(C) Fixed onshore and offshore oil production structures, platforms, derricks, and rigs including all equipment and appurtenances related thereto, as well as completed wells and the wellhead separators, oil separators, and storage facilities used in the production of oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(D) Mobile onshore and offshore oil production facilities including all equipment and appurtenances related thereto as well as completed wells and wellhead equipment, piping from wellheads to oil separators, oil separators, and storage facilities used in the production of oil when such mobile facilities are fixed in position for the purpose of oil production operations, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(E) Oil refining facilities including all equipment and appurtenances related thereto as well as in-plant processing units, storage units, piping, drainage systems and waste treatment units used in the refining of oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(F) Oil storage facilities including all equipment and appurtenances related thereto as well as fixed bulk plant storage, terminal oil storage facilities, consumer storage, pumps and drainage systems used in the storage of oil, but excluding inline or breakout storage tanks needed for the continuous operation of a pipeline system and any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(G) Industrial, commercial, agricultural or public facilities which use and store oil, but excluding any terminal facility, unit or process integrally associated with the handling or transferring of oil in bulk to or from a vessel.

(H) Waste treatment facilities including in-plant pipelines, effluent discharge lines, and storage tanks, but including waste treatment facilities located on vessels and terminal storage tanks and appurtenances for the reception of oily ballast water or tank washings from vessels and associated systems used for off-loading vessels.

(I) Loading racks, transfer hoses, loading arms and other equipment which are appurtenant to a nontransportation-related facility or terminal facility and which are used to transfer oil in bulk to or from highway vehicles or railroad cars.

(J) Highway vehicles and railroad cars which are used for the transport of oil exclusively within the confines of a nontransportation-related facility and which are not intended to transport oil in interstate or intrastate commerce.

(K) Pipeline systems which are used for the transport of oil exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended to transport oil in interstate or intrastate commerce, but excluding pipeline systems used to transfer oil in bulk to or from a vessel.

(2) "transportation-related onshore and offshore facilities" means:

(A) Onshore and offshore terminal facilities including transfer hoses, loading arms and other equipment and appurtenances used for the purpose of handling or transferring oil in bulk to or from a vessel as well as storage tanks and appurtenances for the reception of oily ballast water or tank washings from vessels, but excluding terminal waste treatment facilities and terminal oil storage facilities.

(B) Transfer hoses, loading arms and other equipment appurtenant to a non-transportation-related facility which is used to transfer oil in bulk to or from a vessel.

(C) Interstate and intrastate onshore and offshore pipeline systems including pumps and appurtenances related thereto as well as in-line or breakout storage tanks needed for the continuous operation of a pipeline system, and pipelines from onshore and offshore oil production facilities, but excluding onshore and offshore piping from wellheads to oil separators and pipelines which are used for the transport of oil exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended to transport oil in interstate or intrastate commerce or to transfer oil in bulk to or from a vessel.

(D) Highway vehicles and railroad cars which are used for the transport of oil in interstate or intrastate commerce and the equipment and appurtenances related thereto, and equipment used for the fueling of locomotive units, as well as the rights-of-way on which they operate. Excluded are highway vehicles and railroad cars and motive power used exclusively within the confines of a nontransportation-related facility or terminal facility and which are not intended for use in interstate or intrastate commerce.

## **ATTACHMENT 2**

### **Spill Contingency Plan**

## **SPILL CONTINGENCY PLAN**

### **1.0 Introduction**

An oil Spill Contingency Plan (SCP) is required for MCAS El Toro by 40 CFR 112.7 (d), which states that in cases where spill control structures or equipment are impractical to prevent spills from reaching navigable waters, the owner shall provide a strong spill contingency plan with a written commitment of manpower, equipment and materials required to expeditiously control and remove any harmful quantity of oil discharged. A spill contingency plan for hazardous substances is required by 40 CFR 264.50 which applies to owners and operators of facilities which treat, store or dispose of hazardous waste.

Although most of the facilities at MCAS El Toro which handle oil or hazardous substances have spill control equipment, or will acquire such equipment in the near future, a spill could occur in uncontrolled areas during the transfer of hazardous materials or wastes. In addition, failure of spill control facilities could result in a discharge.

This SCP includes procedures in accordance with Federal, State and Navy regulations concerning spills of oil, hazardous materials and hazardous wastes. The Plan is based upon the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300). The Operational Response section of the El Toro SCP is separated into two major sections; the first covers spills of oil and other petroleum products, and the second covers hazardous materials and wastes excluding petroleum products. Each spill scenario will be unique; however, the procedures outlined in this Plan are applicable to

all spills occurring on the Station. The size of the spill and the dangers posed will determine the extent to which this plan is applied.

## **2.0 Coordination**

Close coordination between departments and agencies involved in response to a discharge or spill event is imperative to ensure proper and complete remedial action. For the majority of environmental episodes expected to occur at MCAS El Toro, this coordination will take place between and through on-station departments, including Environmental Department, Crash Crew, Fire Department, Provost Marshall's Office and the Facilities Management Department (FMD). The station Fire Department and Crash Crew will be the primary On-Scene Coordinators (OSCs) (emergency coordinators). The Environmental Department will also designate an OSC. The capability of the Fire Department and Crash Crew are shown in Attachment 4 of the Oil Spill Prevention, Control, Countermeasure Plan (SPCC), and Contingency Plan for MCAS El Toro. The names and phone numbers of all personnel qualified to act as the emergency coordinator are shown in Attachment 5 of the Oil SPCC and Contingency Plan for MCAS El Toro. The Environmental Department will provide technical support. The MCAS El Toro HAZMAT Team has access to an emergency van, the contents of which are listed in Attachment 6 of the Oil SPCC and Contingency Plan for MCAS El Toro. The Crash Crew, Fire Department, Provost Marshall's Office, and Facilities Management Department will provide all necessary equipment and personnel for the On-Scene Operations Team (OSOT). Available equipment from the FMD Equipment Shops includes bulldozers, tractor/trailers, dump trucks, a vacuum truck, cranes, miscellaneous trucks, fork lifts, barrels (DOT-approved), shovels, brooms, absorbent, pumps, lights and protective clothing for workers.

For larger spills, additional assistance may be required from off-station. Local authorities which are available to provide assistance in emergency situations include local police, fire and ambulance services and the Orange County Emergency Management Division, in accordance with the Mutual Aid Agreement between the County of Orange and MCAS El Toro shown in Attachment 7 of the Oil SPCC and Contingency Plan for MCAS El Toro. Outside spill control contractors are also available when on-station capabilities are exceeded. A local hazardous waste disposal contractor is available to provide limited emergency response personnel and equipment support. The MCAS El Toro Supply Department has various agreements with local vendors which would allow for emergency procurement of spill response supplies.

It is not anticipated that the emergency response capabilities of MCAS El Toro in conjunction with other local assistance will be exceeded by the size of spills which might occur on the Station. However it is possible for a situation to arise where these abilities may be sufficient such as a multiple-site spill, or a spill in conjunction with another form of emergency. In these cases it may be necessary to enlist the help of State and Federal Agencies such as the California Department of Toxic Substances Control, the National Response Center, the Environmental Protection Agency or the Regional or National Response Team. These agencies will provide assistance primarily on an advisory level, however they do have access to trained operations teams which are available for cleanup of large spills.

### **3.0 Spill Prevention**

Every reasonable precaution will be taken to prevent the spillage of hazardous materials by following the general guidelines outlined below at each individual facility:

- The Environmental Department will provide consultation on safety requirements of jobs dealing with chemical substances and the steps which should be taken to avoid spillage through implementation of the measures outlined in this SPCC plan.
- All personnel handling hazardous materials and wastes will be trained to know the equipment, operating procedures and storage requirements.
- Inspection of facilities will be conducted in accordance with preventive maintenance schedules. All spill control and safety equipment will be inspected quarterly and verified to be in working or usable condition.
- General guidelines for spill prevention include:

Pour liquids, powder and dusts into containers slowly to avoid splash, spill or drift. Open sacks with knife rather than tearing. Always keep lids and bungs tightened when containers are not being used. Hazardous materials will be stored in original containers whenever possible. If a leak is detected, transfer to an empty container of the same type that has been properly labeled. Replace rusty or corroded containers. If a tank leak is detected, the contents will be removed via FMD's pump truck.

Surveillance for the early detection of spills will be accomplished through the following:

- All personnel are charged with the responsibility for periodic inspections of work and storage areas used in their operations.



- Underground storage tanks (if present and in operation) are checked periodically, in accordance with the management plans for these tanks, to determine if leakage has occurred.
- All oil and hazardous waste storage areas will be kept under security lock when not attended.

#### **4.0 Spill Control**

General spill control measures involve two steps: (1) confining and containing the spill, and (2) cleaning up the spill once it has been prevented from spreading. Where large amounts of materials are involved, dikes will be used to surround potential spill areas. However, the decision for a dike will be at the discretion of the on-scene coordinator.

The management and mitigation of spills is accomplished through the establishment and administration of a well-organized and well-trained spill control team (On-Scene Operations Team) which will respond to spills in accordance with Table 2-2.

Specific responsibilities must be assigned to ensure that all necessary procedures are followed, and the response operation takes place in an orderly and efficient manner. The initial component in the spill response plan is discovery. A spill will normally be discovered by casual observation, as part of a routine investigation, or during handling or use of a hazardous substance. All personnel at MCAS El Toro who are involved in operations should be trained in proper procedures to be followed in the event that they should discover a spill, and untrained personnel should be cautioned against attempting to deal with a spill. The primary responsibility of a discoverer is to notify the

proper authorities who are trained and equipped to deal with an environmental episode. Depending on the location of the spill, the discoverer must notify the following:

- 1) If the spill has occurred on or near the flight line, runways, taxiways, aircraft parking aprons or any other area associated with aircraft operations, the MCAS El Toro Crash Crew should be notified at extension 3922.
- 2) If the spill has occurred anywhere on the Station outside of the aircraft operations area, the MCAS El Toro Fire Department should be notified at extension 3917.

Each of these organizations has a person qualified and trained to act as the On-Scene Coordinator (OSC). The Crash Crew or the Fire Department will immediately call:

- 1) During duty hours, the Environmental Department at extension 2772/2164/2821.
- 2) During off-duty hours, the Facilities Management Department Trouble Desk at extension 2165.
- 3) Security - Provost Marshall's Office Duty Officer at extension 2232/9911.

The OSC, in conjunction with the Environmental Department, will make a determination of the size and extent of the situation, and pursue further notifications, if necessary. Also, at this time, they will activate the MCAS El Toro Fire Department HAZMAT Team. Agencies to be notified, and the criteria for doing so, are as follows:

**A) On-Station Departments**

- 1) If any threat to human health exists, call the Medical Department at extension 3172.
- 2) If a spill has affected the sewer system, notify the Irvine Ranch Waste District at (714) 476-7500.
- 3) If a spill has an air quality impact, notify the South Coast Air Quality Management district at (800) 288-7664.

**B) County Agencies**

- 1) If health care beyond that which can be provided on-station is needed, or if there is a risk to the health of humans off-station, notify the Orange County Health Care Agency, (714) 667-3700.
- 2) If spill has affected areas outside the station boundary, notify the Orange County Emergency Management Division, (714) 774-0579.

**C) State Agencies**

- 1) If spill has affected, or may affect surface or ground waters, notify the California Regional Water Quality Control Board, Santa Ana Region, (714) 782-4130.
- 2) Notify the California Department of Toxic Substances Control, (310) 590-4800, of all spills which threaten, or may threaten human health or welfare.

**D) Federal Agencies**

- 1) Medium and major spills, classified as over 100 gallons, must be reported to the National Response Center (NRC), (800) 424-8802, regardless of their location or hazard. NRC will notify other agencies as required.

The spill control functions of the various MCAS El Toro personnel are as follows:

**A) Environmental Department**

- 1) Inspect quarterly the spill control equipment at each facility
- 2) Respond to the chemical spills and ensure that cleanup/decontamination procedures are correctly carried out.
- 3) After a chemical spill has been cleared up, certify when the area can be returned to normal use.
- 4) Coordinate evacuation of personnel with the Provost Marshall's Office in accordance with Attachment 8 of the Oil SPCC and Contingency Plan for MCAS El Toro.

**B) Facility Supervisor**

- 1) Ensure that employees receive training in the proper action to be taken if a spill occurs.

- 2) Ensure that proper notification are made in accordance with Table 2-2 immediately.
- 3) Evacuate all affected personnel, if necessary, and have them meet at a predetermined location. Account for all personnel.
- 4) Although the Site Spill Control Coordinator function does not have any specific training requirements, it is recommended that this individual receive training from the Environmental Department.

**C) Employees**

- 1) Notify a supervisor immediately after finding or observing a spill.
- 2) If a supervisor cannot be quickly located, call the proper authorities (MCAS El Toro Fire Department/Crash Crew) to notify them of the situation.
- 3) Minimize the possibilities of a spill by following all safety rules when handling or working around chemicals.

**D) On-Scene Operations Team (MCAS El Toro Fire Department HAZMAT Team)**

- 1) Regularly inspect and become familiar with the various MCAS El Toro facilities and the chemicals and hazardous materials and wastes used at each facility.
- 2) Regularly inspect the spill control equipment at each facility to ensure all equipment is accounted for and operable.

- 3) Attend all training sessions concerning spill control.
- 4) Respond to all calls involving spills. The team leader will contact other team members when a spill alert occurs.

#### **E) Equipment**

Each facility is responsible for acquiring and maintaining their own spill control equipment. In addition, the Station Fire Department, Crash Crew, Environmental Department, and FMD maintain specific equipment for the On-Scene Operations Team including an emergency van, heavy equipment, DOT barrels, sorbent, pumps, lights and protective clothing.

##### **1) Materials**

Listings of spill control materials and safety equipment necessary at each facility are provided under the specific potential spill site (Section 2.0 of the Oil SPCC and Contingency Plan for MCAS El Toro).

##### **2) Location**

Limited spill control equipment will be centrally located at each facility that requires a spill control team. A locker or suitable enclosure will be furnished to house the equipment. Additional heavy equipment and specialized equipment for major spills over 100 gallons are available through the Fire Department and El Toro Crash Crew.

**F) Training****1) On-Scene Operations Team (OSOT) Members (HAZMAT Team)**

The MCAS El Toro Fire Department will ensure proper hazardous material response training for OSOT members.

- a) All OSOT members will become intimately familiar with the various facility layouts and the chemicals used.
- b) All members will be trained in the use of self-contained breathing apparatus. Practice for donning, using, and removing of the equipment will be done on a quarterly basis. Practice equipment (e.g., air tanks) will be replenished with after each actual or training session use.
- c) Members will be indoctrinated in classification of hazardous materials, their characteristics, and how to clean a spill and decontaminate the area. Incompatibilities between chemicals will also be covered.

The above items will be covered in the 40-hour OSHA health and safety training course which is required for all team members

**2) Other Employees**

- a) All employees shall be instructed in the safety significance of the chemical spill procedure by their supervisor. It is recommended that all

employees working routinely with hazardous materials receive the 24-hour waste handler's class offered by the Environmental Department.

- b) Each new or transferred employee shall be trained to react to chemical spills before exposure to the chemicals.
- c) Supervisors will orient employees in the specific safety requirements of their work assignments. Supervisors will also provide continuing on-the-job instruction in safety procedures in consultation with the Environmental Department.

G) Recordkeeping

- 1) The Environmental Department will keep a record of the quarterly inspections of spill control lockers/storage areas and any problems encountered.
- 2) The spill control team will keep records of locker/storage area and building inspections and problems found; a copy will be forwarded to the Environmental Department.
- 3) The Environmental Department will keep a file on all training and include names, dates, and subject areas.
- 4) The Environmental Department personnel will investigate and report on each actual spill occurring at MCAS. A file of these reports will be maintained in the Environmental Office.



- 5) If quantities of materials are involved in a spill which require a report to be filed to the appropriate regulatory agency, as required by 40 CFR 300-395, it will be prepared and filed by the Environmental Department.

## **5.0 Operational Response Phases for Oil Removal**

### **A) Phase I – Discovery and Notification**

The person who first discovers a spill or leak of oil will note the size of the spill; the location; stop the source of the spill if possible; determine if the spill is contained; and note any hazards which are present (i.e., fire, injuries, etc.). The discoverer's responsibility is then to initiate the notification procedure as outlined in Section 4.0 (above).

### **B) Phase II – Preliminary Assessment and Initiation of Action**

The On-Scene Coordinator or acting OSC is responsible for promptly initiating preliminary assessment. This assessment will be conducted using available information, supplemented where possible by an on-scene inspection. The OSC will evaluate the magnitude and severity of the discharge or threat to public health and the environment, assess the feasibility of removal, determine potential responsible parties and determine if jurisdiction exists for additional response actions. If appropriate response actions are being undertaken by the person or unit responsible for the discharge, the OSC will provide surveillance and any requested assistance. If effective actions are not being taken, and/or if the responsible party is unable to deal with the discharge, the OSC will then initiate action by the MCAS El Toro Fire Department.

All personnel, except those responsible for emergency response, will be directed to evacuate the area, when necessary in accordance with Attachment 8 of the Oil SPCC and Contingency Plan for MCAS El Toro. The OSC or person of authority (supervisor/principal investigator) will designate an area for employees to report.

C) Phase III – Containment, Countermeasures, Clean-up and Disposal

Defensive actions should begin as soon as possible to prevent or minimize damage to public health or welfare or to the environment. All sources of spark or flame are to be eliminated. These actions may include analysis of water samples to assist in determination of the source and spread of the oil, controlling the source of the discharge, placement of physical barriers such as berms or dikes to deter the spread of the oil or controlling the discharge of water in the storm drain or sewer system. Appropriate actions should be taken to recover the oil or minimize its effects. The method chosen for doing so should be consistent with the protection of public health and welfare and the environment. Sinking agents will not be used. Recovered oil and contaminated absorbents, rags, etc. will be placed in DOT-approved containers and disposed of in accordance with federal, state, and local laws.

D) Phase IV – Documentation and Cost Recovery

Documentation will be collected and maintained to support all response actions taken and to form the basis for cost recovery.

Documentation should be sufficient to prove the source and circumstances of the incident, the responsible party or unit, and impacts and potential impacts to the public health and welfare and the environment, as well as accurate accounting of costs incurred. Documentation should also be collected for scientific study of the environment and for the research and development of improved response technology, where appropriate. The Environmental Department will ensure the necessary collection and safeguarding of information, samples and reports. Samples and information must be gathered expeditiously during the response to ensure an accurate record of the impacts incurred. Information and reports will be transmitted to the appropriate agencies responsible for follow-up actions.

## **6.0 Operational Response Phases for Hazardous Substances**

### **A) Phase I – Discovery and Notification**

The person who first discovers a spill or leak of hazardous material will note the size of the spill; the location; if possible, determine the type of material; determine if the spill is contained; and note any hazards which are present (i.e., fire, injuries, etc.). The discoverer's responsibility is then to initiate the notification procedure as outline in Section 4.0.

### **B) Phase II – Preliminary Assessment**

If the reported release potentially requires immediate removal, the preliminary assessment should be conducted immediately. Other releases will be assessed as soon as practicable. The assessment should be based on readily available

information, including: evaluation of the magnitude of the hazard; identification of the source and nature of the release; determination of the ability of the responsible party or unit to perform a proper response; and determination of whether immediate removal is necessary. The assessment may include collection and review of data such as site management practices, information obtained from the generating unit, photographs, and personal interviews. The Environmental Department should conduct a site visit, if this may be accomplished safely. If appropriate response actions are being undertaken by the person or unit responsible for the discharge, the Environmental Department will provide surveillance and any requested assistance. If effective actions are not being taken, and/or if the responsible party is unable to deal with the discharge, the Environmental Department will then initiate action by the MCAS El Toro Fire Department HAZMAT Team.

C) Phase III – Immediate Removal

Immediate removal will be appropriate when the Environmental Department determines that the initiation of immediate removal action will prevent or mitigate immediate and significant risk of harm to human life or health or to the environment from any one or more of the following:

- 1) Human, animal or food chain exposure to acutely toxic substances.
- 2) Contamination of a potable water supply.
- 3) Fire and/or explosion.
- 4) Other immediately acute situations.

Immediate actions may include, but are not limited to:

- 1) Collecting and analyzing samples to determine the source and dispersion of the hazardous substance.
- 2) Providing alternative water supplies.
- 3) Fencing the contaminated area.
- 4) Controlling the source of release.
- 5) Moving hazardous substances offsite for storage or disposal.
- 6) Placing physical barriers such as berms or dikes to control or stop the spread of the release.
- 7) Controlling water discharge both upstream and downstream of the spill.
- 8) Recommending the evacuation of threatened individuals.

D) Phase IV – Evaluation and Determination of Appropriate Response

When the preliminary assessment indicates that further response is necessary, or if the Environmental Department requests that further response should follow and immediate removal action, the appropriate response must be determined. An inspection of the release site will be conducted as soon as possible to assess the nature and extent of the release. The major objective of this inspection is to determine if there is any immediate danger to persons living or working near the site. The collection of samples should be minimized during inspection, unless there is an apparent risk to the public. Examples of apparent risk include use of nearby wells for drinking water, citizen complaints of unusual taste or odor in drinking water, or chemical odors or unusual health problems in the vicinity of the release. In these cases, a sampling program should be developed to detect the possibility for human exposure to hazardous

substances. The site inspection may also address the need for immediate removal action, assessment of amounts, types and location of hazardous substances stored in the vicinity, assessing the potential for migration of the spilled substance from its original location and a determination and documentation of immediate threats to the public and/or the environment.

E) Phase V – Planned Removal

At the conclusion of Phase IV, the evaluation should result in a plan for the removal of the released substance, and cleanup of the affected area. Planned removal will be conducted when any of the following conditions exist:

- 1) Actual or potential contact with hazardous substances by nearby population.
- 2) Contaminated drinking water at the tap.
- 3) Hazardous substances in drums, barrels, tanks, or other bulk storage containers, that are known to pose a serious threat to public health or the environment.
- 4) Highly contaminated soils at or near the surface, which pose a threat to public health or the environment.
- 5) Serious threat of fire or explosion.
- 6) Weather conditions that may cause substances to migrate and pose a threat to public health or the environment.

Planned removal actions will end when the Environmental Department determines that the threat to public health or the environment has been abated.

F) Phase VI – Remedial Action

Remedial actions are responses to releases that provide permanent remedies to prevent or mitigate the migration of a release of hazardous substances into the environment. A remedial investigation will be conducted by the Environmental Department to determine the nature and extent of the problem created by the release. This investigation will include sampling and monitoring, as necessary, and the gathering of sufficient information to determine the necessity of and proposed extent of remedial action. Part of this investigation involves the determination of whether the threat can be abated by controlling the source of the contamination at or near the area where the hazardous substances were originally located, or whether additional actions will be necessary because the hazardous substances have migrated away from this area. The following factors should be considered when determining the type or types of remedial action which may be appropriate:

- 1) Actual or potential direct contact with hazardous substances by nearby population.
- 2) Absence of an effective drainage control system.
- 3) Contaminated drinking water at the tap.
- 4) Hazardous substances in bulk storage containers which pose a threat to public health or the environment.

- 5) Highly contaminated soils at or near the surface.
- 6) Serious threat of fire or explosion.
- 7) Weather conditions which may cause substances to migrate.

Source control remedial actions are appropriate if a substantial concentration of hazardous substances remain at or near the area where they were originally located. In some instances it may be necessary to mitigate the migration of the substances (off-site remedial actions). These actions should be taken when the OSC determines that source control remedial actions may not effectively mitigate the threat when there is a significant hazard to public health, welfare or the environment. Criteria to be evaluated in determining the most effective type of control include:

- 1) The extent to which the substances pose a threat to public health, welfare or the environment.
- 2) The extent to which the substances have migrated or are expected to migrate from the area of their original location.
- 3) The extent to which natural or man-made barriers currently contain the hazardous substances and the adequacy and integrity of these barriers.

In some situations, if initial remedial measures are determined to be feasible and necessary to limit exposure or threat of exposure to a significant health or environmental hazard, initial remedial measures can and should begin before



final selection of an appropriate remedial action if such measures are cost-effective.

G) Phase VII – Documentation and Cost Recovery

Documentation and cost recovery considerations for hazardous substances are essentially the same as for oil discharges. They are repeated here for continuity. Documentation will be collected and maintained to support all response actions taken and to form the basis for cost recovery. Documentation should be sufficient to prove the source and circumstances of the incident, the responsible party or unit, and impacts and potential impacts to the public health and welfare and the environment, as well as accurate accounting of costs incurred. Documentation should also be collected for scientific study of the environment and for the research and development of improved response technology, where appropriate. The Environmental Department will ensure the necessary collection and safeguarding of information, samples and reports. Samples and information must be gathered expeditiously during the response to ensure an accurate record of the impacts incurred. Information and reports will be transmitted to the appropriate agencies responsible for follow-up actions.

## **7.0 Special Considerations**

### **A) Personnel Safety**

Safety is of primary concern during response to a spill event. Response personnel should be properly trained in safety procedures prior to their being allowed to participate in response to a spill. Proper protective clothing should be worn, consistent with the type of spill and the expected exposure level. Selecting the proper level of protective clothing is imperative in reducing the potential for adverse health effects. Personnel making initial entry to a site with unknown conditions should be provided with an approved pressure-demand self contained breathing apparatus (SCBA), chemical resistant coveralls, chemical resistant gloves (inner and outer), boots with steel toe and shank, a hard hat and intrinsically safe two-way radio communications at a minimum. Optional equipment consists of a fully encapsulating chemical-resistant suit, chemical resistant boots and disposable protective suit, gloves and boots. The OSC is responsible for safety at spill sites.

### **B) Site Safety**

A spill site must be controlled to prevent or reduce the possibility of exposure to contaminants and the transport of hazardous substances from the site. The most effective method of site control is to establish zones in which prescribed operations occur. The movement of personnel and equipment is restricted to predetermined access control points, limiting the potential for contamination to migrate from the work area. Three concentric zones are recommended:

- 1) Exclusion Zone - The exclusion zone is the innermost area, and contains the site where contamination has occurred, or could be expected to occur.
- 2) Contamination Reduction Zone - This zone surrounds the exclusion zone, and provides a transition area between contaminated and clean areas. Decontamination of personnel and equipment should be conducted within this zone.
- 3) Support Zone - The support zone, the outermost area of the site, is considered to be a noncontaminated area. Contaminated or potentially contaminated people and equipment are not permitted in this zone, but must remain in Zone 2 until decontamination.

The size and shape of each of these zones should be based on site-specific conditions, including physical and topographical features, weather conditions, properties of the spilled substance, and dimensions of the contaminated area. Boundaries between the zones should be flexible to allow for modifications in the response activities.

## **ATTACHMENT 3**

### **Listing of Storage Tanks at MCAS El Toro**

### List of Storage Tanks at MCAS El Toro

Tank No.	Size (gallons)	Content	Type*	Construction Material
T-A	30,000	JP-5	UG	Fiberglass
T-B	30,000	JP-5	UG	Fiberglass
T-C	2,500	Waste JP-5	UG	Fiberglass
T-2	2,000	JP-5	UG	Steel
T-3	2,000	JP-5	UG	Steel
T-4	2,000	Waste Oil	UG	Steel
T-6	2,000	JP-5	UG	Steel
T-7	2,000	JP-5	UG	Steel
T-10	1,000	JP-5	UG	Steel
189	50,000	Waste Oil	UG	Concrete
191	45,000	Waste Oil	UG	Concrete
196	25,000	JP-5	UG	Concrete
197	50,000	JP-5	UG	Concrete
198	50,000	JP-5	UG	Concrete
199	25,000	JP-5	UG	Concrete
200	25,000	JP-5	UG	Concrete
201	50,000	JP-5	UG	Concrete
202	50,000	JP-5	UG	Concrete
203	25,000	JP-5	UG	Concrete
204	50,000	JP-5	UG	Concrete
205	25,000	JP-5	UG	Concrete
206	50,000	Gasoline	UG	Concrete
207	50,000	Gasoline	UG	Concrete
208	50,000	JP-5	UG	Concrete
209	25,000	JP-5	UG	Concrete
210	25,000	JP-5	UG	Concrete
211	50,000	JP-5	UG	Concrete
212	50,000	JP-5	UG	Concrete
213	25,000	JP-5	UG	Concrete
214	25,000	JP-5	UG	Concrete
215	50,000	JP-5	UG	Concrete
216	50,000	JP-5	UG	Concrete
217	25,000	JP-5	UG	Concrete
218	25,000	Gasoline	UG	Concrete
298A	3,000	Gasoline	UG	Steel
298B	3,000	Gasoline	UG	Steel
314B	50,000	Waste Oil	UG	Concrete
380A	10,000	Diesel	UG	Steel
380B	600	Gasoline	AG	Steel
388D	2,000	Diesel	UG	Steel
388E	500	Diesel	UG	Steel
398	108,000	JP-5	UG	Concrete
439A	5,000	No. 2 Fuel Oil	UG	Steel

\* AG = Aboveground Tank  
 UG = Underground Tank

**List of Storage Tanks at MCAS El Toro  
(Continued)**

Tank No.	Size (gallons)	Content	Type*	Construction Material
447A	10,000	JP-5	UG	Steel
447B	10,000	JP-5	UG	Steel
547	567,000	JP-5	UG	Steel
548	567,000	JP-5	UG	Steel
549	567,000	JP-5	UG	Steel
550	567,000	JP-5	UG	Steel
551	567,000	JP-5	UG	Steel
625	500	Waste Oil	UG	Steel (to be removed)
637-1	12,000	Gasoline	UG	Steel
637-2	12,000	Gasoline	UG	Steel
637-3	12,000	Gasoline	UG	Steel
651-1	12,000	Gasoline	UG	Steel
651-2	12,000	Gasoline	UG	Steel
651-3	12,000	Gasoline	UG	Steel
651-4	12,000	Gasoline	UG	Steel
651-5	500	Oil	UG	Steel
651-6	500	Oil	UG	Steel
651-7	500	Waste Oil	UG	Steel
658A	10,000	JP-5	UG	Steel
658B	10,000	JP-5	UG	Steel
673B	300	Waste Oil	UG	Concrete
797	10,000	Gasoline	UG	Fiberglass
800A	10,000	Gasoline	UG	Fiberglass
800B	10,000	Diesel	UG	Fiberglass
800C	10,000	Diesel	UG	Fiberglass
800D	1,000	Waste Oil	UG	Fiberglass
800E	1,000	Waste Oil	UG	Fiberglass
862	30,000	JP-5	AG	Steel

\* AG = Aboveground Tank  
UG = Underground Tank

## **ATTACHMENT 4**

### **Hazardous Material Response Capabilities**

## HAZMAT EQUIPMENT AND SUPPLIES

### Quantity and Description

5 Trelleborg Butyl-Viton TECP Level A Suits  
 5 Sijal acid splash Level B suits  
 1 case Tyvek-Saranex Level C suits (medium)  
 1 case Tyvek-Saranex Level C suits (large)  
 1 case Tyvek-Saranex Level C suits (extra large)  
 4 pair Butyl gloves  
 4 pair Viton gloves  
 4 pair Nitrile gloves  
 4 pair multi-use gloves (silver shield)  
 1 case cotton knit gloves  
 1 box latex surgical gloves  
 5 flash suits (for use over level A suits)  
 5 proximity suits  
 4 1-hour SCBAs  
 4 1-hour SCBA spare bottles  
 2 Drager gas detection kits  
 1 box Drager Pet-hydrocarbon tubes  
 1 box Drager Chlorine tubes  
 1 box Drager Ammonia tubes  
 1 box Drager Poly-test tubes  
 1 Gastech GX-86 multi-meter  
 1 radiation detection meter  
 1 Hydrocarbon detection lamp  
 1 Firefinder

### Basic Library Set

1 Dangerous Properties of Industrial Materials  
 1 Condensed Chemical Dictionary  
 1 Chemical Substances in Workroom Air  
 1 Merck Index  
 1 CHRIS manual  
 1 Farm Chemicals Handbook  
 1 Guide to Threshold Limit Values

### Capability

Respiratory/Splash/Absorption Protection  
 Splash/Absorption Protection  
 Splash/Absorption Protection  
 Splash/Absorption Protection  
 Splash/Absorption Protection  
 Hand Protection  
 Hand Protection  
 Hand Protection  
 Hand Protection  
 Hand Protection  
 Hand Protection  
 Splash/Absorption Protection  
 Splash/Absorption Protection  
 Respiratory Protection  
 Respiratory Protection  
 Chemical Identification  
 Chemical Identification  
 Chemical Identification  
 Chemical Identification  
 Chemical Identification  
 Radiation Identification  
 Chemical Identification  
 Fire Identification



### Quantity and Description

- 1 Guide to Protective Clothing
- 1 DOT Emergency Guide Book
- 1 NFPA Hazardous Materials Handbook
- 1 Class A fire extinguisher
- 1 Class B fire extinguisher
- 1 Class C fire extinguisher
- 1 Class D fire extinguisher
- 1 50-pound bag Speedy-dry
- 1 100-pound bag neutralizer (acid)  
(sodium Bicarb-soda ash)
- 1 100-pound bag neutralizer (base)  
(sodium dihydrogen phosphate)
- Assorted absorbent booms and pads

### Hand Tool Set

- 2 Non-sparking bung wrench
- 1 3/8" socket set
- 1 1/2" socket set
- 1 3/4" socket set
- 2 18" hand hacksaw frames
- 4 18" hand hacksaw blades
- 2 Non-sparking hammer
- 1 Pocket (utility) Knife
- 2 Rubber mallet
- 2 Wood mallet
- 1 Metal snips
- 1 Non-sparking pliers (chain nose)
- 1 Non-sparking pliers (diagonal)
- 1 Pliers (lineman)
- 1 Non-sparking pliers (round nose)
- 1 Non-sparking pliers (slip joint)
- 1 Pry bar
- 2 pair High power binoculars
- 1 Portable weather station
- 4 Spark-proof hand lights
- 1 G.E. two-way radio (base)

## Capability

- Reference Material  
Reference Material  
Reference Material  
Fire Suppression  
Chemical Fire Suppression  
Electrical Fire Suppression  
Chemical Fire Suppression  
Spill Clean-up  
Neutralizer  
  
Neutralizer  
  
Spill Clean-up  
  
Opening Drums  
As Needed  
As Needed  
As Needed  
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As Needed  
As Needed  
As Needed  
As Needed  
Spill Observation  
Ambient Weather Conditions  
Visual Aid  
Communications

2 Motorola MX hand-held radios (base)	Communications
1 Motorola Spectra C9 radio with dual control heads (600 Mhz)	Communications
2 Motorola STX hand-held radios (600 Mhz)	Communications
2 two-way head set radios (49 Mhz)	Communications
1 two-way radio base station (49 Mhz)	Communications
Decontamination solutions	Decontamination
Decontamination supplies (buckets, sponges, brushes, etc.)	Decontamination
2 50' garden hoses	Decontamination
1 first aid trauma box with supplies	Injury Response
1 Refrigerator	Sample Preservation
1 set base water maps	Reference Material
1 set base flood control maps	Reference Material
1 set base utilities maps	Reference Material
1 Thomas Brothers map book	Reference Material
1 set base district maps	Reference Material
2 Non-sparking Bung Wrenches	Drum Opening
1 Bung Wrench	Drum Opening
1 Chlorine "A" Kit	Chemical Identification
2 Drum Up-enders	Drum Handlers
1 case Decon pools	Decontamination

**ATTACHMENT 5**

**List of Emergency Coordinators**

**LIST OF EMERGENCY COORDINATORS  
MCAS EL TORO**

**Environmental Department**

D. Childers (Primary)

Office: (714) 726-2772  
Home: (714) 551-8991  
Beeper: (714) 298-3822

J. A. Kleim (Alternate)

Office: (714) 726-2772  
Home: (714) 770-2454  
Beeper: (714) 567-8917

**Other Emergency Telephone Numbers**

MCAS El Toro Crash Crew

(24 Hours) (714) 726-3922

MCAS El Toro HAZMAT Team

(24 Hours) (714) 726-3919

**ATTACHMENT 6**

**MCAS El Toro Fire Department Emergency Van Equipment List**

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>CAPABILITY</u>
EMERGENCY SPILL GUIDE	1	Procedures
BUILDING GUIDE	1	Location Reference
STREET MAPS	1	Location Reference
BUNG WRENCH	2	Remove Old Drum Cap
BUNG HOLE COVERS	50	Drum Hole Caps
FIRST AID KIT	1	Injury Response
AURAL PROTECTOR	3	Ear Protection
EMERGENCY EYE WASH	1	Eye Cleansing
EXTRA WATER BOTTLE-1 GAL	1	Eye Cleansing
PLASTIC BUCKET	2	Clean up/Decon
HARD HAT	3	Head Protection
GLOVES-FABRIC	6 pr.	Hand Protection
-RUBBER	6 pr.	Hand Protection
COVERALLS	4 pr.	Body Protection
DUCT TAPE	1 roll	PPE/General
BLANKET	2	Thermal/Shock Protection
ABSORBENT-SPEEDY DRY	100 lb.	Spill Clean-up
-SORBENT PILLOWS	4	Spill Clean-up
-SORBENT PADS	24	Spill Clean-up
-BREGOIL SPONGE	40 lb.	Spill Clean-up
ABSORBENT-SAFESTEP	50 lb.	Spill Clean-up
VERMICULITE-COARSE	40 lb.	Spill Clean-up
PUMP-HAND OPERATED	1	Spill Clean-up
BROOM	1	Clean-up
SQUEEGEES	2	Spill Clean-up
NEUTRALIZER-HYDRATED LIME	50 lb.	Neutralize Acid/Base Spills
PLASTIC BAGS	1 Box	Sample Collection
RESPIRATORS-ORGANIC	4	Respiratory Protection
-DUST AND FUME	2	Respiratory Protection
FACE SHIELDS	3	Splash Protection

## MCAS EL TORO FIRE DEPARTMENT EMERGENCY VAN EQUIPMENT LIST

(Continued)

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>CAPABILITY</u>
LANTERN	1	Visual Aid
LANTERN BATTERY-6v	1	Visual Aid
FLASHLIGHT	1	Visual Aid
FLASHLIGHT BATTERY-1.5v	1	Visual Aid
SHOVEL	2	Clean-up
MISC. TOOLS	--	As Needed
RAINGEAR	3 Sets	Rain Protection
BOOTS	3 Sets	Feet Protection
COLORIMETER	1	Chemical I.D.
PH PAPER	1 Roll	Chemical I.D. (Acid/Base)
WIDE MOUTH GLASS JARS	1 Box	Sample Collection
TEST VIAL	Var	
AIRPACKS-SURVIVAL	2	Respiratory Protection
-EXTRA AIR BOTTLES	2	Respiratory Protection
CHEMICALS SUITS	2	Splash/Absorption Protection
PLASTIC	1 Roll	Cover Material
HAND CLEANER	2	Personnel Clean-up
APRONS-DISPOSABLE	100 Roll	Personnel Protection
WIRE BRUSHES	2	Clean-up/Decon
DRUM COVERS-SHOWER CAP TYPE	12	Protective Covers/ Isolation
HW LABELS AND FORMS	As Nec.	Records/Identification
HMIS INFORMATION	As Nec.	Records/Identification

## **ATTACHMENT 7**

**Mutual Aid Agreement**





UNITED STATES MARINE CORPS  
MARINE CORPS AIR STATION  
EL TORO (SANTA ANA), CALIFORNIA 92709-5001

IN REPLY REFER TO:

7050/29A

1FE

28 AUG 1989

Chief Larry Holms  
Orange County Fire Chief  
180 S. Water St.  
Orange, CA 92666

Dear Chief Holms,

The original of the Letter of Agreement between the Commanding General, Marine Corps Air Station, El Toro and the County of Orange has been consummated. The Duplicate Original is enclosed for your records.

If you have any further questions please direct them to Captain R. A. Roe at (714) 726-3205 or 3207.

Sincerely yours,

O. D. SAYRE  
Assistant Chief of Staff, Comptroller  
By direction of the Commanding General

Encl: Duplicate Original Letter of Agreement.

Blind copy to

CG, MCAS EL TORO (3) 1CH(1), 1JA(1), 1AR(1)



# ORIGINAL

## LETTER OF AGREEMENT

Between The  
COMMANDING GENERAL, MARINE CORPS AIR STATION  
El Toro (Santa Ana), California  
And  
COUNTY OF ORANGE

ORIGINAL  
CLERK OF THE BOARD  
ORANGE COUNTY

THIS AGREEMENT, made this 2nd day of MAY 1989, between the U.S. Marine Corps Air Station, El Toro (Santa Ana), California, hereinafter referred to as the Air Station, and the County of Orange, hereinafter referred to as the County, replaces the agreement between these two parties dated 7 Dec 1982 for mutual aid fire and rescue assistance and any modifications thereto.

WHEREAS, it is the responsibility of the County to provide fire and rescue services for those areas and properties over which Orange County has jurisdiction and which are adjacent to the Marine Corps Air Station El Toro and

WHEREAS, it is the desire of the Air Station to protect those areas and properties adjacent to it from the ravages and destruction of fire and assist with rescue service, and

WHEREAS, it is possible for the fire department of the Air Station to respond to and assist in fire and rescue on such adjacent areas and properties with more facility and in a lesser period of time than fire companies of the County, and

WHEREAS, it is possible that a fire may break out within the confines of the Air Station which may exceed the capabilities of the Air Station fire department, and

WHEREAS, it is the desire of the Air Station and the County to assist each other in affording fire and rescue services for those areas and properties adjacent to and including the Air Station on a mutual assistance basis, and

WHEREAS, this Agreement is between a Federal agency and a local agency, to provide fire and rescue assistance to each other, and the fact that the available force is crash, structural, and aircraft should make no difference in the Agreement, as whatever assistance is requested and available is dispatched,

### IT IS THEREFORE AGREED:

1. The Air Station, through its fire department, shall offer initial fire and rescue services within the capabilities of the Fire Department of the Air Station to the areas adjacent to the Air Station. However, during extreme emergency situations, this immediate area is waived to include all areas protected by the County.
2. The County shall retain the primary responsibility for affording fire and rescue services to those areas outside the Air Station to which the Air Station offers its services.

3. After the Air Station has provided initial fire protection services, the Air Station will assist the County Fire Department, upon their arrival at the fire, to continue to combat the fire until its extinguishment or release by the County Fire Department.
4. The County will furnish fire, rescue, hazardous material assistance to the Air Station in those instances where the County Fire Department is notified that assistance is required within the confines of the Air Station and will continue such assistance until release by the Air Station Fire Department.
5. The availability and the extent of the assistance to be provided at the time rests solely within the discretion of the respective parties to this Agreement who are providing assistance.
6. The area to which the Air Station has primary responsibility for emergency services that the County may be requested to assist is shown in Enclosure 1.
7. The technical head of the fire department of the requesting service shall assume full charge of the operations; but, if that individual specifically requests a senior officer of a fire department furnishing assistance to assume command, that individual shall not, by relinquishing command, be relieved of his/her responsibility for the operation, even though the apparatus, personnel, and equipment of the agency rendering assistance shall be under the immediate supervision of and shall be the immediate responsibility of the senior officer of the fire department rendering assistance.
8. The chief fire officers and personnel of both fire departments are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours consistent with local security requirements, and as feasible, to jointly conduct pre-fire planning inspections, drills, and fire investigations.
9. Neither the Air Station nor the county shall receive any compensation or reimbursement from the other for any services provided in performance of this Agreement, however, direct expenses and losses which are additional firefighting cost over and above normal operating costs incurred while fighting a fire on property which is under the jurisdiction of the United States may be reimbursed in accordance with the Federal Fire Prevention and Control Act of 1974 (Public Law No. 93-498, 15 U.S.C. 2201 et seq.) and its implementing regulations 44, C.F.R. 151.
10. The Air Station and County agree to hold harmless and waive all claims against the other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of such Agreement. Any service performed under this Agreement by any officer or employee of the United States or any member of any armed force of the United States shall constitute service rendered in the line of duty in such office, employment, or force. Service performed by any other individual pursuant to this letter of Agreement shall not be deemed federal service or employment.

11. This Agreement will be reviewed biennially at least 120 days prior to the anniversary date. It may be revised at any time upon the mutual consent in writing of the parties concerned. A request for modification will be furnished by one party to the other by written notice at least 30 days prior to the desired effective date of such modification. This Agreement may be canceled/terminated at any time by mutual consent of the parties concerned. It may also be canceled by either party upon giving at least 180 days written notice to the other party.

In WITNESS WHEREOF, the parties hereto have caused the Agreement to be executed by the Commanding General, Marine Corps Air Station, El Toro (Santa Ana), California and by the County of Orange through its duly authorized officers as of the dates below their names.

Dated: 5-2, 1989

County of Orange

By

Thomas F. Riley  
Chairman, Board of Supervisors

Approved as to Form:

Dated:

8-8-89

, County Counsel  
Orange County, California

Marine Corps Air Station, El Toro  
(Santa Ana), California

By Carol Brown  
4/18/89 Deputy

By

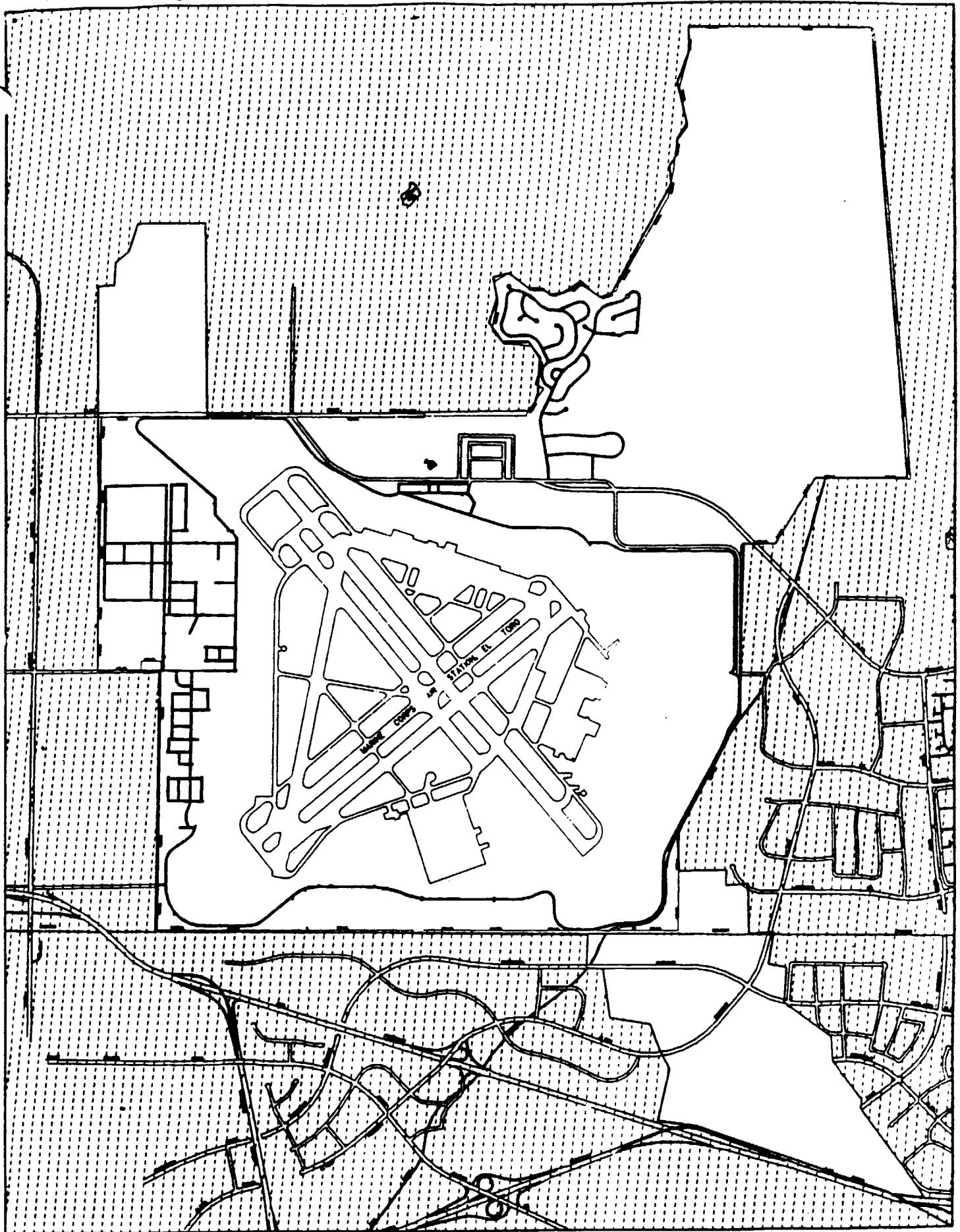
J. E. Underwood  
J. E. UNDERWOOD, Col. USMC  
Chief of Staff

Dated:

5-2-89

Signed and certified that a copy of this document has been delivered to the Chairman of the Board.

Spide D. Luth  
Clerk of the Board of Supervisors,  
County of Orange, California



**MARINE CORPS AIR STATION EL TORO**



## **ATTACHMENT 8**

### **Evacuation Plan**

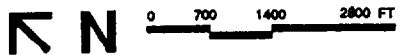
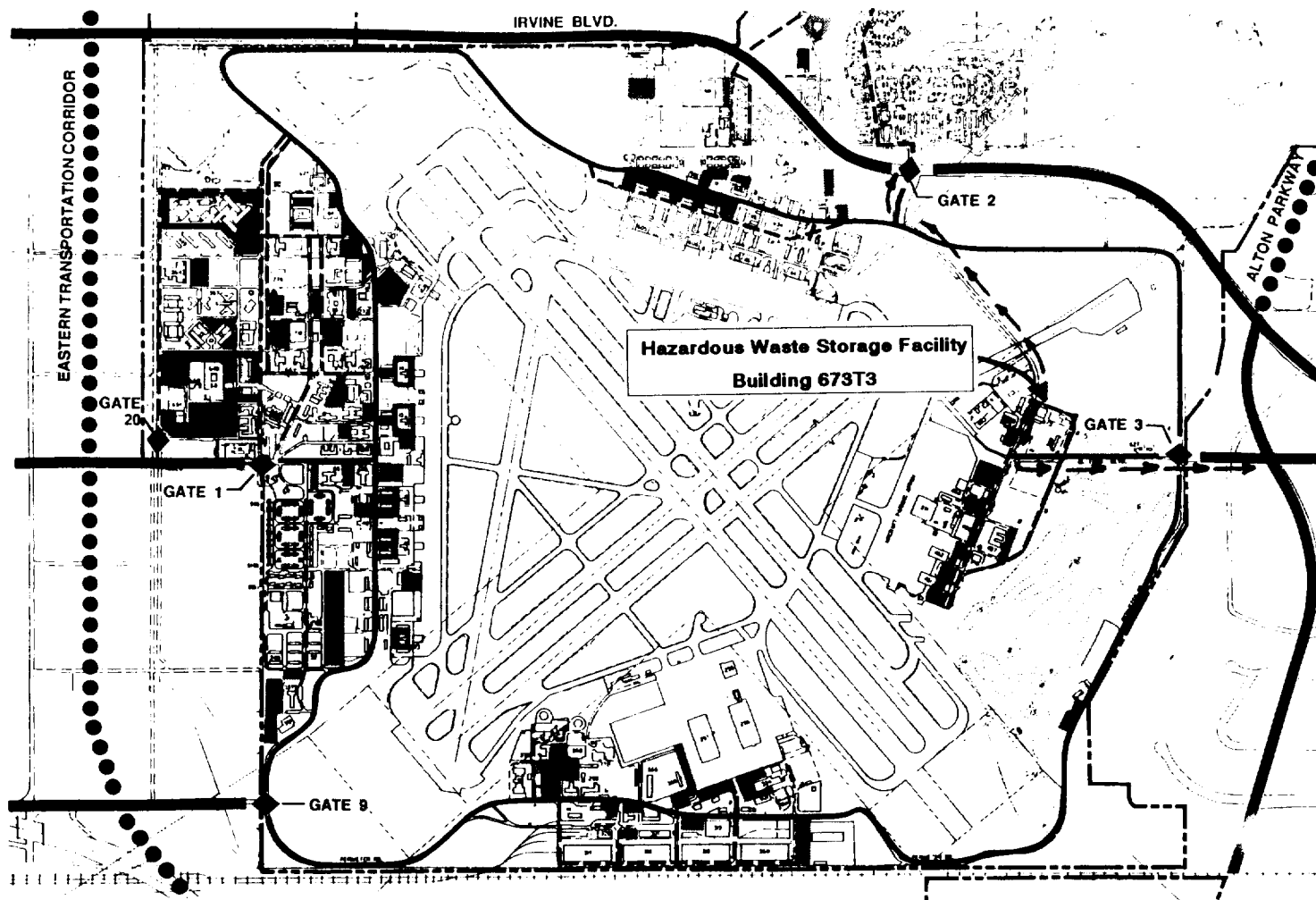
## **EVACUATION PLAN**

INTERNAL ALARMS WILL BE USED AS THE SIGNAL TO BEGIN EVACUATION OF THE HAZARDOUS WASTE STORAGE AND ACCUMULATION AREAS. INTERNAL ALARMS INCLUDE HORNS, BELLS, AND CHIMES.

AFTER THE INTERNAL ALARM SOUNDS, PERSONNEL WILL LEAVE THE HAZARDOUS WASTE AREA AS QUICKLY AND SAFELY AS POSSIBLE. THE FIRE DEPARTMENT AND THE PROVOST MARSHALL'S OFFICE (PMO) WILL THEN BE NOTIFIED VIA THE EXTERNAL ALARM AND WILL RESPOND TO THE SCENE.

IF APPROPRIATE, THE EMERGENCY COORDINATOR ON SITE WILL ORDER AN AREA EVACUATION. PMO WILL BE RESPONSIBLE FOR EFFECTING THE AREA EVACUATION, USING VOICE INSTRUCTION TO DIRECT PERSONNEL. THE ACCESS POINTS SHOWN ON THE ATTACHED STATION MAP WILL BE USED FOR EVACUATION AS NEEDED.

# EVACUATION ROUTE



MARINE CORPS AIR STATION • EL TORO • SANTA ANA, CALIFORNIA

Adapted from: MCAS El Toro Masterplan, 1991



Appendix H

## Procedure

1. The sample holder shall be filled with the material to be tested. If the sample of waste is a large monolithic block, a portion shall be cut from the block having the dimensions of a 3.3 cm (1.3 in.) diameter x 7.1 cm (2.8 in.) cylinder. For a fixated waste, samples may be cast in the form of a 3.3 cm (1.3 in.) diameter x 7.1 cm (2.8 in.) cylinder for purposes of conducting this test. In such cases, the waste may be allowed to cure for 30 days prior to further testing.

2. The sample holder shall be placed into the Structural Integrity Tester, then the hammer shall be raised to its maximum height and dropped. This shall be repeated fifteen times.

3. The material shall be removed from the sample holder, weighed, and transferred to the extraction apparatus for extraction.

## Analytical Procedures for Analyzing Extract Contaminants

The test methods for analyzing the extract are as follows:

1. For arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D [2,4-dichlorophenoxyacetic acid] or 2,4,5-TP [2,4,5-trichlorophenoxypropionic acid]: "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11).

2. [Reserved]

For all analyses, the methods of standard addition shall be used for quantification of species concentration.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981]

## APPENDIX III—CHEMICAL ANALYSIS TEST METHODS

Tables 1, 2, and 3 specify the appropriate analytical procedures, described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," (incorporated by reference, see § 260.11) which shall be used to determine whether a sample contains a given Appendix VII or VIII toxic constituent.

Table 1 identifies each Appendix VII or VIII organic constituent along with the approved measurement method. Table 2 identifies the corresponding methods for inorganic species. Table 3 summarizes the contents of SW-846 and supplies specific section and method numbers for sampling and analysis methods.

Prior to final sampling and analysis method selection the analyst should consult the specific section or method described in SW-846 for additional guidance on which of the approved methods should be employed for a specific sample analysis situation.

TABLE 1—ANALYSIS METHODS FOR ORGANIC CHEMICALS CONTAINED IN SW-846

Compound	Method Numbers
Acetonitrile	8030, 8240
Acrolein	8030, 8240
Acrylamide	8015, 8240
Acrylonitrile	8030, 8240
2-Amino-1-methylbenzene (o-Toluidine)	8250
4-Amino-1-methylbenzene (p-Toluidine)	8250
Aniline	8250
Benzene	8020, 8024
Benz(a)anthracene	8100, 8250, 8310
Benzo(a)pyrene	8100, 8250, 8310
Benzotrichloride	8120, 8250
Benzyl chloride	8120, 8250
Benzo(b)fluoranthene	8100, 8250, 8310
Bis(2-chloroethoxymethane)	8010, 8240
Bis(2-chloroethyl)ether	8010, 8240
Bis(2-chloroisopropyl)ether	8010, 8240
Carbon disulfide	8015, 8240
Carbon tetrachloride	8010, 8240
Chlordane	8080, 8250
Chlorinated biohenyls	8080, 8250
Chlorinated dibenzo-p-dioxins	8280
Chlorinated dibenzofurans	8280
Chloroacetaldehyde	8010, 8240
Chlorobenzene	8020, 8240
Chloroform	8010, 8240
Chloromethane	8010, 8240
2-Chlorophenol	8040, 8250
Chrysene	8100, 8250, 8310
Cresote	8100, 8250
Cresol(s)	8040, 8250
Cresylic Acid(s)	8040, 8250
Dichlorobenzene(s)	8010, 8120, 8250
Dichloroethane(s)	8010, 8240
Dichloromethane	8010, 8240
Dichlorophenoxyacetic acid	8150, 8250
Dichloropropanol	8120, 8250
Dimethyl sulfate	8250, 8270
1,1-Dimethylhydrazine (UDMH)	8250
2,4-Dimethylphenol	8040, 8250
Dinitrobenzene	8090, 8250
4,6-Dinitro-o-cresol	8040, 8250
2,4-Dinitrotoluene	8090, 8250
2,6-Dinitrotoluene	8080, 8250
Endrin	8080, 8250
2-Ethoxyethanol	8030, 8240
Ethyl ether	8015, 8240
Ethylene dibromide	8010, 8240
Ethylene thiourea	8250, 8330
Formaldehyde	8015, 8240
Formic acid	8250
Heptachlor	8080, 8250
Hexachlorobenzene	8120, 8250
Hexachlorobutadiene	8120, 8250
Hexachloroethane	8010, 8240
Hexachlorocyclopentadiene	8120, 8250
Lindane	8080, 8250
Maleic anhydride	8250
Methanol	8010, 8240
Methomyl	8250
Methyl bromide	8010, 8240, 8260
Methyl ethyl ketone	8015, 8240
Methyl isobutyl ketone	8015, 8240

**Part 261, App. III**

**40 CFR Ch. I (7-1-90 Edition)**

**TABLE 1—ANALYSIS METHODS FOR ORGANIC CHEMICALS CONTAINED IN SW-846—Continued**

Compound	Method Numbers
Napthalene.....	8100, 8250
Napthoquinone.....	8090, 8250
Nitrobenzene.....	8090, 8250
4-Nitrophenol.....	8040, 8240
2-Nitropropane.....	8030, 8240
Paraldehyde (trimer of acetaldehyde).....	8015, 8240
Pentachlorophenol.....	8040, 8250
Phenol.....	8040, 8250
Phorate.....	8140
Phosphorodithioic acid esters.....	8140
Phthalic anhydride.....	8090, 8250
2-Picoline.....	8090, 8250
Pyridine.....	8090, 8250
Tetrachlorobenzene(s).....	8120, 8250
Tetrachloroethane(s).....	8010, 8240
Tetrachloroethene.....	8010, 8240
Tetrachlorophenol.....	8040, 8250
Toluene.....	8020, 8024
Toluene diisocyanate(s).....	8250
Toluenediamine.....	8250
2,4-Toluenediamine.....	8250
2,6-Toluenediamine.....	8250
3,4-Toluenediamine.....	8250
Toxaphene.....	8080, 8250
Trichloroethane.....	8010, 8240
Trichloroethene(s).....	8010, 8240
Trichlorofluoromethane.....	8010, 8240
Trichlorophenol(s).....	8040, 8250
2,4,5-Trichlorophenoxy propionic acid.....	8150, 8250
Trichloropropane.....	8010, 8240
Vinyl chloride.....	8010, 8240
Vinylidene chloride.....	8010, 8240
Xylene.....	8020, 8240

<sup>1</sup> Analyte for phenanthrene and carbazole; if these are present in a ratio between 1.4:1 and 5:1 creosote should be considered present.

**TABLE 2—ANALYSIS METHODS FOR INORGANIC CHEMICALS AND MISCELLANEOUS GROUPS OF ANALYTES CONTAINED IN SW-846<sup>a</sup>**

Compound	Third Edition Method(s)	Second Edition Method(s)
Aluminum.....	8010	
Antimony.....	8010	7040, 7041
Arsenic.....	8010	7080, 7081
Barium.....	8010	7080, 7081
Beryllium.....	6010, 7090, 7091	
Boron.....	8010	

**TABLE 2—ANALYSIS METHODS FOR INORGANIC CHEMICALS AND MISCELLANEOUS GROUPS OF ANALYTES CONTAINED IN SW-846<sup>a</sup>—Continued**

Compound	Third Edition Method(s)	Second Edition Method(s)
Cadmium.....	6010	7130, 7131
Calcium.....	6010	
Chromium.....	6010	7190, 7191
Chromium, Hexavalent.....	7198	7195, 7196, 7197
Cobalt.....	6010	
Copper.....	6010, 7210, 7211	
Iron.....	6010, 7380, 7381	
Lead.....	6010	7420, 7421
Magnesium.....	6010	
Manganese.....	6010, 7460, 7461	
Mercury.....		7470, 7471
Molybdenum.....	6010	
Nickel.....	6010	7520, 7521
Osmium.....	7550	
Potassium.....	6010	
Selenium.....	6010	7740, 7741
Silicon.....	6010	
Silver.....	6010	7760, 7761
Sodium.....	6010, 7770	
Thallium.....	6010, 7840, 7841	
Vanadium.....	6010, 7910, 7911	
Zinc.....	6010, 7950, 7951	
Cyanides.....		9010
Total Organic Halides.....	9022	9020
Sulfides.....		9030
Sulfates.....	9035, 9036, 9038	
Total Organic Carbon.....	9060	
Phenolics.....	9065, 9066 <sup>b</sup> , 9067	
Oil and Grease.....	9070, 9071	
Total Coliform.....	9131, 9132	
Nitrate.....	9200	
Chlorides.....	9250, 9251, 9252	
Gross Alpha and Gross Beta.....	9310	
Alpha-Emitting Radium Isotopes.....	9315	
Radium-228.....	9320	

<sup>a</sup> The Third Edition of SW-846 and its Revision 1 are available from the Government Printing Office, Superintendent of Documents, Washington, DC 20402, (202) 783-3238, document number 955-001-00000-1.

<sup>b</sup> When Method 9066 is used it must be preceded by the manual distillation specified in procedure 7.1 of Method 9065. Just prior to distillation in Method 9065, adjust the sulfuric acid-preserved sample to pH 4 with 1 + 9 NaOH. After the manual distillation is completed, the autoanalyzer manifold is simplified by connecting the re-sample line directly to the sampler.

## CHAPTER SEVEN

### INTRODUCTION AND REGULATORY DEFINITIONS

#### 7.1 IGNITABILITY

##### 7.1.1 Introduction

— This section discusses the hazardous characteristic of ignitability. The regulatory background of this characteristic is summarized, and the regulatory definition of ignitability is presented. The two testing methods associated with this characteristic, Methods 1010 and 1020, can be found in Chapter Eight.

The objective of the ignitability characteristic is to identify wastes that either present fire hazards under routine storage, disposal, and transportation or are capable of severely exacerbating a fire once started.

##### 7.1.2 Regulatory Definition

The following definitions have been taken verbatim from the RCRA regulations (40 CFR 261.21).

##### Characteristics Of Ignitability Regulation

A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

1. It is a liquid, other than an aqueous solution, containing < 24% alcohol by volume, and it has a flash point < 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79 or D-93-80, or a Setaflash Closed Cup Tester, using the test method specified in ASTM standard D-3278-78, or as determined by an equivalent test method approved by the Administrator under the procedures set forth in Sections 260.20 and 260.21. (ASTM standards are available from ASTM, 1916 Race Street, Philadelphia, PA 19103.)
2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.
3. It is an ignitable compressed gas, as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or by equivalent test methods approved by the Administrator under Sections 260.20 and 260.21.
4. It is an oxidizer, as defined in 49 CFR 173.151.

## Ignitable Compressed Gas

For the purpose of this regulation the following terminology is defined:

1. Compressed gas. The term "compressed gas" shall designate any material or mixture having in the container an absolute pressure exceeding 40 psi at 21°C (70°F) or, regardless of the pressure at 21°C (70°F), having an absolute pressure exceeding 104 psi at 54°C (130°F), or any liquid flammable material having a vapor pressure exceeding 40 psi absolute at 38°C (100°F), as determined by ASTM Test D-323.
2. Ignitable compressed gas. Any compressed gas, as defined in Paragraph 1, above, shall be classed as an "ignitable compressed gas" if any one of the following occurs:
  - a. Either a mixture of 13% or less (by volume) with air forms a flammable mixture, or the flammable range with air is wider than 12%, regardless of the lower limit. These limits shall be determined at atmospheric temperature and pressure. The method of sampling and test procedure shall be acceptable to the Bureau of Explosives.
  - b. Using the Bureau of Explosives' Flame Projection Apparatus (see Note, below), the flame projects more than 18 in. beyond the ignition source with valve opened fully, or the flame flashes back and burns at the valve with any degree of valve opening.
  - c. Using the Bureau of Explosives' Closed Drum Apparatus (see Note, below), there is any significant propagation of flame away from the ignition source.
  - d. Using the Bureau of Explosives' Closed Drum Apparatus (see Note, below), there is any explosion of the vapor-air mixture in the drum.

NOTE: Descriptions of the Bureau of Explosives' Flame Projection Apparatus, Open Drum Apparatus, Closed Drum Apparatus, and method of tests may be procured from the Association of American Railroads, Operations and Maintenance Dept., Bureau of Explosives, American Railroad Building, Washington, DC. 20036; 202-293-4048.

## Oxidizer

For the purpose of this regulation, an oxidizer is any material that yields oxygen readily to stimulate the combustion of organic matter (e.g., chlorate, permanganate, inorganic peroxide, or a nitrate).

## 7.2 CORROSIVITY

### 7.2.1 Introduction

The corrosivity characteristic, as defined in 40 CFR 261.22, is designed to identify wastes that might pose a hazard to human health or the environment due to their ability to:

1. Mobilize toxic metals if discharged into a landfill environment;
2. Corrode handling, storage, transportation, and management equipment; or
3. Destroy human or animal tissue in the event of inadvertent contact.

In order to identify such potentially hazardous materials, EPA has selected two properties upon which to base the definition of a corrosive waste. These properties are pH and corrosivity toward Type SAE 1020 steel.

The following sections present the regulatory background and the regulation pertaining to the definition of corrosivity. The procedures for measuring pH of aqueous wastes are detailed in Methods 9040 and 9041, Chapter Six. Method 1110, Chapter Eight, describes how to determine whether a waste is corrosive to steel. Use Method 9095, Paint Filter Liquids Test, Chapter Six, to determine free liquid.

### 7.2.2 Regulatory Definition

The following material has been taken nearly verbatim from the RCRA regulations.

1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:
  - a. It is aqueous and has a  $\text{pH} \leq 2$  or  $\geq 12.5$ , as determined by a pH meter using either the test method specified in this manual (Method 9040) (also described in "Methods for Analysis of Water and Wastes" EPA 600/4-79-020, March 1979), or an equivalent test method approved by the Administrator under the procedures set forth in Sections 260.20 and 260.21.
  - b. It is a liquid and corrodes steel (SAE 1020) at rate  $> 6.35$  mm (0.250 in.) per year at a test temperature of  $55^{\circ}\text{C}$  ( $130^{\circ}\text{F}$ ), as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69, as standardized in this manual (Method 1110) or an equivalent test method approved by the Administrator under the procedures set forth in Sections 260.20 and 260.21.

## 7.3 REACTIVITY

### 7.3.1 Introduction

The regulation in 40 CFR 261.23 defines reactive wastes to include wastes that have any of the following properties: (1) readily undergo violent chemical change; (2) react violently or form potentially explosive mixtures with water; (3) generate toxic fumes when mixed with water or, in the case of cyanide- or sulfide-bearing wastes, when exposed to mild acidic or basic conditions; (4) explode when subjected to a strong initiating force; (5) explode at normal temperatures and pressures; or (6) fit within the Department of Transportation's forbidden explosives, Class A explosives, or Class B explosives classifications.

This definition is intended to identify wastes that, because of their extreme instability and tendency to react violently or explode, pose a problem at all stages of the waste management process. The definition is to a large extent a paraphrase of the narrative definition employed by the National Fire Protection Association. The Agency chose to rely on a descriptive, prose definition of reactivity because the available tests for measuring the variegated class of effects embraced by the reactivity definition suffer from a number of deficiencies.

### 7.3.2 Regulatory Definition

#### 7.3.2.1 Characteristic Of Reactivity Regulation

A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

1. It is normally unstable and readily undergoes violent change without detonating.
2. It reacts violently with water.
3. It forms potentially explosive mixtures with water.
4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or to the environment.
5. It is a cyanide- or sulfide-bearing waste that, when exposed to conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or to the environment. (Interim Guidance for Reactive Cyanide and Reactive Sulfide, Steps 7.3.3 and 7.3.4 below, can be used to detect the presence of cyanide and sulfide in wastes.)
6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
8. It is a forbidden explosive, as defined in 49 CFR 173.51, or a Class A explosive, as defined in 49 CFR 173.53, or a Class B explosive, as defined in 49 CFR 173.88.
9. A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

#### 7.3.3 Interim Guidance For Reactive Cyanide

7.3.3.1 The current EPA action level is:

Total releasable cyanide: 250 mg HCN/kg waste.

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#### 7.3.3.2 Test Method to Determine Hydrogen Cyanide Released from Wastes

### 1.0 SCOPE AND APPLICATION

1.1 This method is applicable to all wastes, with the condition that wastes that are combined with acids do not form explosive mixtures.

1.2 This method provides a way to determine the specific rate of release of hydrocyanic acid upon contact with an aqueous acid.

1.3 This test measures only the hydrocyanic acid evolved at the test conditions. It is not intended to measure forms of cyanide other than those that are evolvable under the test conditions.

### 2.0 SUMMARY OF METHOD

2.1 An aliquot of the waste is acidified to pH 2 in a closed system. The gas generated is swept into a scrubber. The analyte is quantified. The procedure for quantifying the cyanide is Method 9010, Chapter Five, starting with Step 7.2.7 of that method.

### 3.0 SAMPLE HANDLING AND PRESERVATION

3.1 Samples containing, or suspected of containing, sulfide or a combination of sulfide and cyanide wastes should be collected with a minimum of aeration. The sample bottle should be filled completely, excluding all head space, and stoppered. Analysis should commence as soon as possible, and samples should be kept in a cool, dark place until analysis begins.



3.2 It is suggested that samples of cyanide wastes be tested as quickly as possible. Although they can be preserved by adjusting the sample pH to 12 with strong base, this will cause dilution of the sample, increase the ionic strength, and, possibly, change other physical or chemical characteristics of the waste which may affect the rate of release of the hydrocyanic acid. Storage of samples should be under refrigeration and in the dark.

3.3 Testing should be performed in a ventilated hood.

#### 4.0 APPARATUS AND MATERIALS (See Figure 1)

4.1 Round-bottom flask - 500-mL, three-neck, with 24/40 ground-glass joints.

4.2 Stirring apparatus - To achieve approximately 30 rpm. This may be either a rotating magnet and stirring bar combination or an overhead motor-driven propeller stirrer.

4.3 Separatory funnel - With pressure-equalizing tube and 24/40 ground-glass joint and Teflon sleeve.

4.4 Flexible tubing - For connection from nitrogen supply to apparatus.

4.5 Water-pumped or oil-pumped nitrogen gas - With two-stage regulator.

4.6 Rotometer - For monitoring nitrogen gas flow rate.

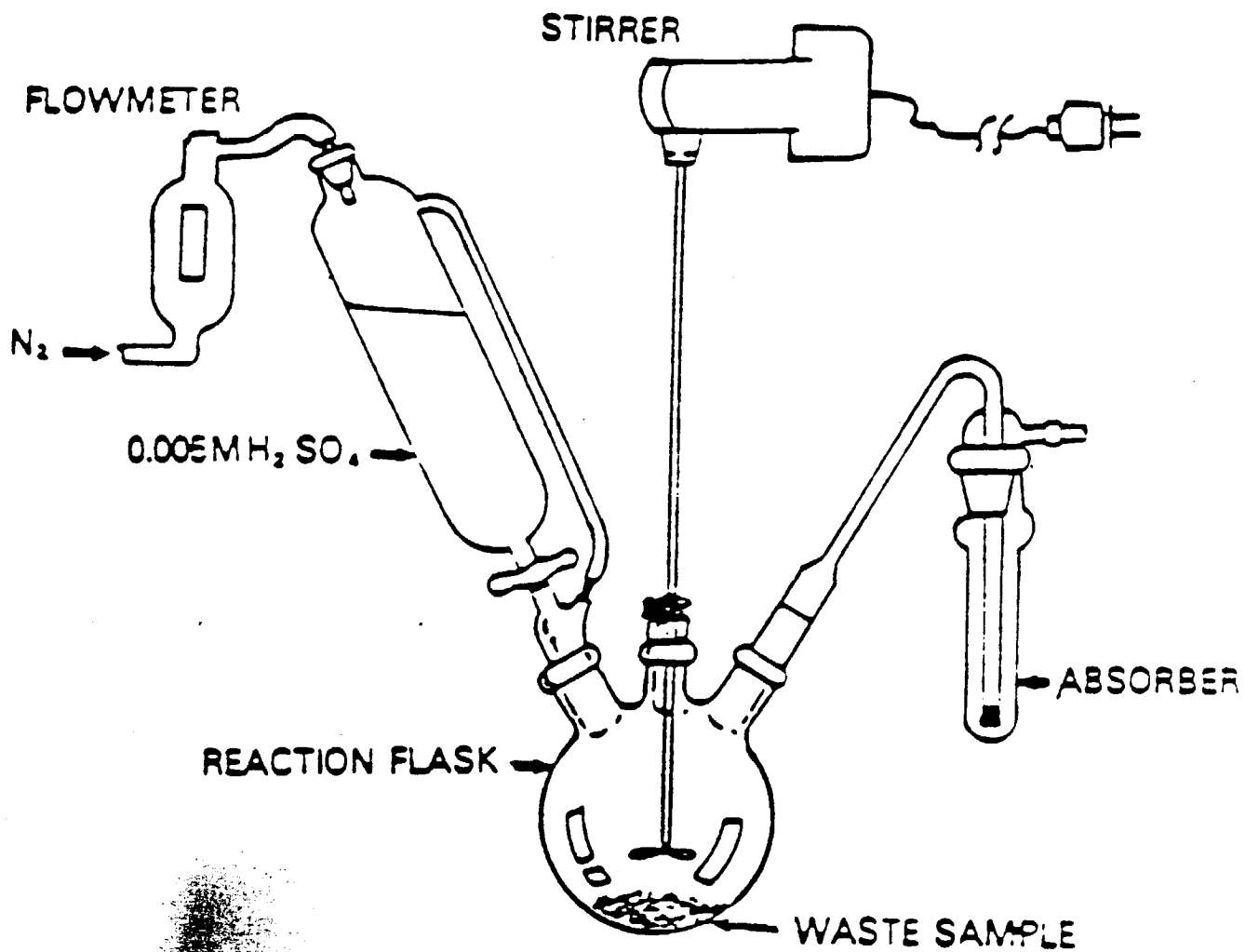
#### 5.0 REAGENTS

5.1 Sulfuric acid (0.005M),  $H_2SO_4$ . Add 2.8 mL concentrated  $H_2SO_4$  to water and dilute to 1 L. Withdraw 100 mL of this solution and dilute to 1 L to make the 0.005M  $H_2SO_4$ .

5.2 Cyanide reference solution. Dissolve approximately 2.5 g of KOH and 2.51 g of KCN in 1 liter of water. Cyanide concentration in this solution is 1 mg/mL.

5.3 Sodium hydroxide solution (1.25N), NaOH. Dissolve 50 g of NaOH in water and dilute to 1 liter with water.

FIGURE 1.  
APPARATUS TO DETERMINE HYDROGEN CYANIDE RELEASED FROM WASTES



5.4 Sodium hydroxide solution (0.25N), NaOH. Dilute 200 mL of sodium hydroxide solution (Step 5.3) to 1 liter with water.

5.5 Stock cyanide solution (1 mg/mL). Dissolve 2.51 g of KCN and 2 g of KOH in 1 liter of distilled water. Standardize with 0.0192N AgNO<sub>3</sub>. Dilute to appropriate concentration so that 1 mL = 1 mg CN.

5.6 Intermediate cyanide solution. Dilute 50 mL of stock solution to 1 liter with water.

5.7 Standard cyanide solution (5 mg/L). Prepare fresh daily by diluting 100 mL of intermediate solution to 1 liter with water, and store in a glass-stoppered bottle.

5.8 Silver nitrate solution. Prepare by crushing approximately 5 g of AgNO<sub>3</sub> crystals and drying to constant weight at 40°C. Weigh 3.3 g of dried AgNO<sub>3</sub>, dissolve in water, and dilute to 1 liter.

5.9 Rhodanine indicator. Dissolve 20 mg of p-dimethylaminobenzal-rhodanine in 100 mL of acetone.

5.10 Methyl red indicator. Prepare by dissolving 0.02 g methyl red in 60 mL of water and 40 mL of acetic acid.

## 6.0 SYSTEM CHECK

6.1 The operation of the system can be checked and verified using the cyanide reference solution (Step 5.2). Perform the procedure using the reference solution as a sample and determine the percent recovery. A recovery of 50% is adequate to demonstrate proper system operation.

## 7.0 PROCEDURE

7.1 Add 50 mL of 0.25N NaOH solution to a calibrated scrubber and dilute with distilled water to obtain an adequate depth of liquid.

7.2 Close the system and adjust the flow rate of nitrogen, using the rotometer. Flow should be 60 mL/min.

7.3 Add to the system 10 g of the waste to be tested.

7.4 With the nitrogen flowing, add enough acid to take the pH to 2. While starting the 30 minute test period.

7.5 Begin stirring while the acid is entering the round-bottom flask.

7.6 After 30 minutes, close off the nitrogen and disconnect the scrubber. Determine the amount of cyanide in the scrubber by Method 9010, Chapter Five, starting with Step 7.2.7 of the method.

## 8.0 CALCULATIONS

8.1 Determine the specific rate of release of HCN, using the following parameters:

A = Concentration of HCN in scrubber (mg/L).  
(This is obtained from Method 9010.)

L = Volume of solution in scrubber (L).

W = Weight of waste used (kg).

S = Time of measurement = Time N<sub>2</sub> stopped - Time  
N<sub>2</sub> started (sec).

$$R = \text{specific rate of release} = \frac{A \cdot L}{W \cdot S}$$

$$\text{Total releasable HCN (mg/kg)} = R \times 1,800.$$

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### 7.3.4 Interim Guidance For Reactive Sulfide

7.3.4.1 The current EPA action level is:

Total releasable sulfide: 500 mg H<sub>2</sub>S/kg waste.

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#### 7.3.4.2 Test Method to Determine Hydrogen Sulfide Released from Wastes

## 1.0 SCOPE AND APPLICATION

1.1 This method is applicable to all wastes, with the condition that waste that are combined with acids do not form explosive mixtures.

1.2 This method provides a way to determine the specific rate of release of hydrogen sulfide upon contact with an aqueous acid.

1.3 This procedure releases only the evolved hydrogen sulfide at the test conditions. It is not intended to measure forms of sulfide other than those that are evolvable under the test conditions.

## 2.0 SUMMARY OF METHOD

2.1 An aliquot of the waste is acidified to pH 2 in a closed system. The gas generated is swept into a scrubber. The analyte is quantified. The procedure for quantifying the sulfide is given in Method 9030, Chapter Five.

### 3.0 SAMPLE HANDLING AND PRESERVATION

3.1 Samples containing, or suspected of containing, sulfide wastes should be collected with a minimum of aeration. The sample bottle should be filled completely, excluding all head space, and stoppered. Analysis should commence as soon as possible, and samples should be kept in a cool, dark place until analysis begins.

3.2 It is suggested that samples of sulfide wastes be tested as quickly as possible. Although they can be preserved by adjusting the sample pH to 12 with strong base and adding zinc acetate to the sample, these will cause dilution of the sample, increase the ionic strength, and, possibly, change other physical or chemical characteristics of the waste which may affect the rate of release of the hydrogen sulfide. Storage of samples should be under refrigeration and in the dark.

3.3 Testing should be performed in a ventilated hood.

### 4.0 APPARATUS (See Figure 2)

4.1 Round-bottom flask - 500-mL, three-neck, with 24/40 ground-glass joints.

4.2 Stirring apparatus - To achieve approximate 30 rpm. This may be either a rotating magnet and stirring bar combination or an overhead motor-driven propeller stirrer.

4.3 Separatory funnel - With pressure-equalizing tube and 24/40 ground-glass joint and Teflon sleeve.

4.4 Flexible tubing - For connection from nitrogen supply to apparatus.

4.5 Water-pumped or oil-pumped nitrogen gas - With two-stage regulator.

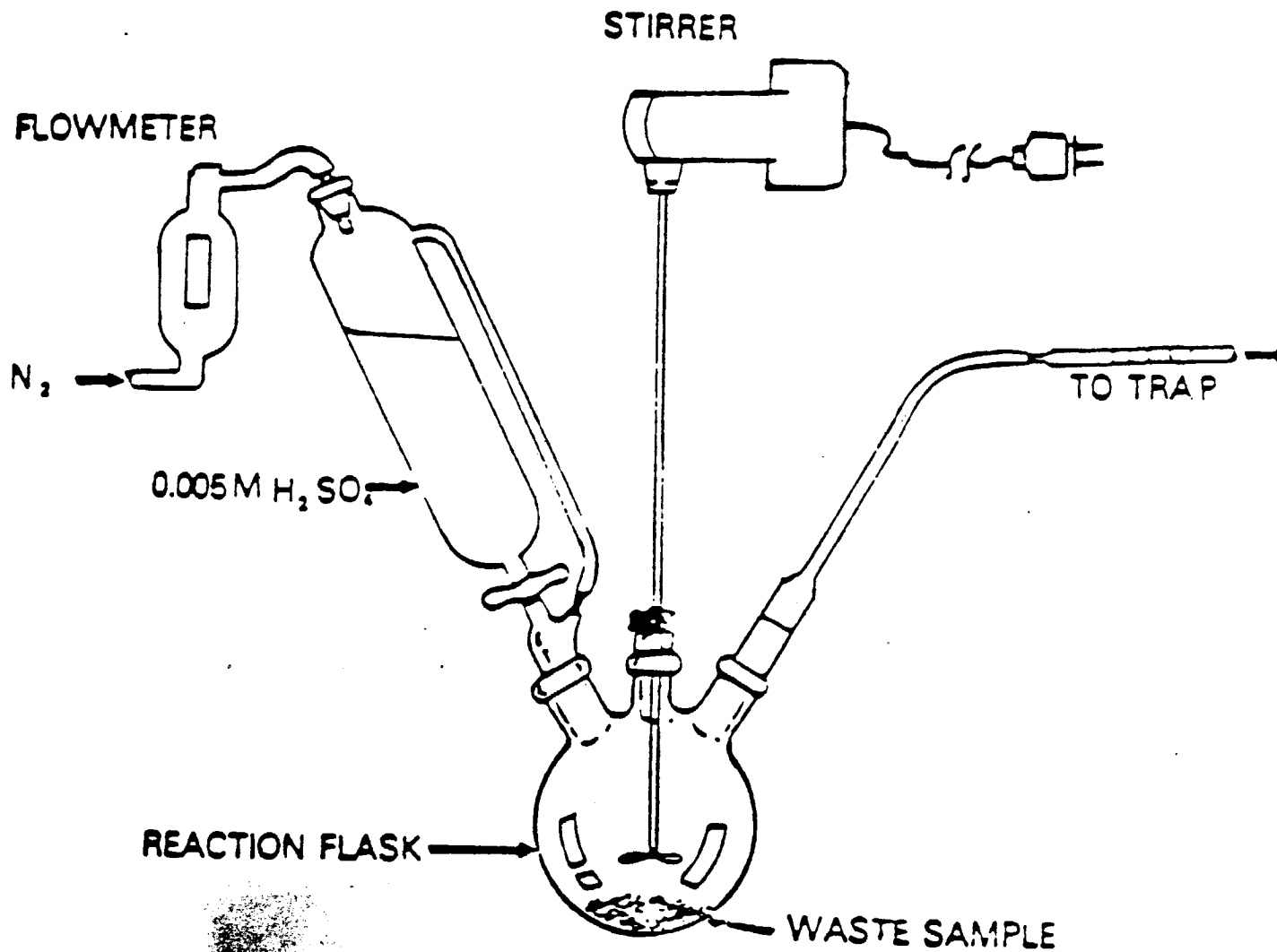
4.6 Rotometer - For monitoring nitrogen gas flow rate.

4.7 Detector tube for sulfide - Industrial-hygiene type (100-2,000 ppm range).

### 5.0 REAGENTS

5.1 Sulfuric acid (0.005M),  $H_2SO_4$ . Add 2.8 mL concentrated  $H_2SO_4$  to water and dilute to 1 L. Withdraw 100 mL of this solution and dilute to 1 L to make the 0.005M  $H_2SO_4$ .

FIGURE 2.  
APPARATUS TO DETERMINE HYDROGEN SULFIDE RELEASED FROM WASTES



5.2 Sulfide reference solution - Dissolve 4.02 g of  $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$  in 1.0 liter of water. This solution contains 680 ppm hydrogen sulfide. Dilute this stock solution to cover the analytical range required (100-680 ppm).

5.3 Sodium hydroxide solution (1.25N), NaOH. Dissolve 50 g of NaOH in water and dilute to 1 liter with water.

5.4 Sodium hydroxide solution (0.25N), NaOH. Dilute 200 mL of sodium hydroxide solution to 1 liter with water.

## 6.0 SYSTEM CHECK

6.1 The operation of the system can be checked and verified using the sulfide reference solution (Step 5.2). Perform the procedure using the reference solution as a sample and determine the percent recovery. A recovery of 50% is adequate to demonstrate proper system operation.

## 7.0 PROCEDURE

The procedure employs a scrubber solution with wet method quantification.

7.1 Add 50 mL of 0.25N NaOH solution to a calibrated scrubber and dilute with distilled water to obtain an adequate depth of liquid.

7.2 Assemble the system and adjust the flow rate of nitrogen, using the rotometer. Flow should be 60 mL/min.

7.3 Add to the system 10 g of the waste to be tested.

7.4 With the nitrogen flowing, add enough acid to fill the system half full, while starting the 30 minute test period.

7.5 Begin stirring while the acid is entering the round-bottom flask.

7.6 After 30 minutes, close off the nitrogen and disconnect the scrubber. Determine the amount of sulfide in the scrubber by Method 9030, Chapter Five.

7.7 Substitute the following for Step 7.3.2 in Method 9030: The trapping solution must be brought to a pH of 2 before proceeding. Titrate an aliquot of the trapping solution to a pH 2 end point and calculate the amount of acid needed for the 200-mL sample for analysis.

## 8.0 CALCULATIONS

8.1 Determine the specific rate of release of  $\text{H}_2\text{S}$ , using the following parameters:

A = Concentration of  $\text{H}_2\text{S}$  in scrubber (mg/L).  
(This is obtained from Method 9030.)

L = Volume of solution in scrubber (L).

W = Weight of waste used (kg).

S = Time of experiment = Time N<sub>2</sub> stopped - Time N<sub>2</sub> started (sec).

R = specific rate of release =  $\frac{A \cdot L}{W \cdot S}$

Total releasable H<sub>2</sub>S (mg/kg) = R x 1,800.

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## 7.4 EXTRACTION PROCEDURE TOXICITY

### 7.4.1 Introduction

The Extraction Procedure (EP) is designed to simulate the leaching a waste will undergo if disposed of in a sanitary landfill. This test is designed to simulate leaching that takes place in a sanitary landfill only. It is a laboratory test in which a representative sample of a waste is extracted with distilled water maintained at a pH of 5, using acetic acid. The extract obtained from the EP (the "EP Extract") is then analyzed to determine if any of the thresholds established for the eight elements (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver), four pesticides (Endrin, Lindane, Methoxychlor, Toxaphene), and two herbicides (2,4,5-trichlorophenoxypropionic acid, 2,4-dichlorophenoxyacetic acid) have been exceeded. If the EP Extract contains any one of the above substances in an amount equal to or exceeding the levels specified in 40 CFR 261.24, the waste possesses the characteristic of Extraction Procedure Toxicity and is a hazardous waste.

### 7.4.2 Summary of Procedure

The Extraction Procedure consists of five steps (refer to Figure 3):

#### 1. Separation Procedure

A waste containing unbound liquid is filtered, and, if the solid phase is < 0.5% of the waste, the solid phase is discarded and the filtrate analyzed for trace elements, pesticides, and herbicides (Step 5). If the waste contains > 0.5% solids, the solid phase is extracted and the liquid phase stored for later use.

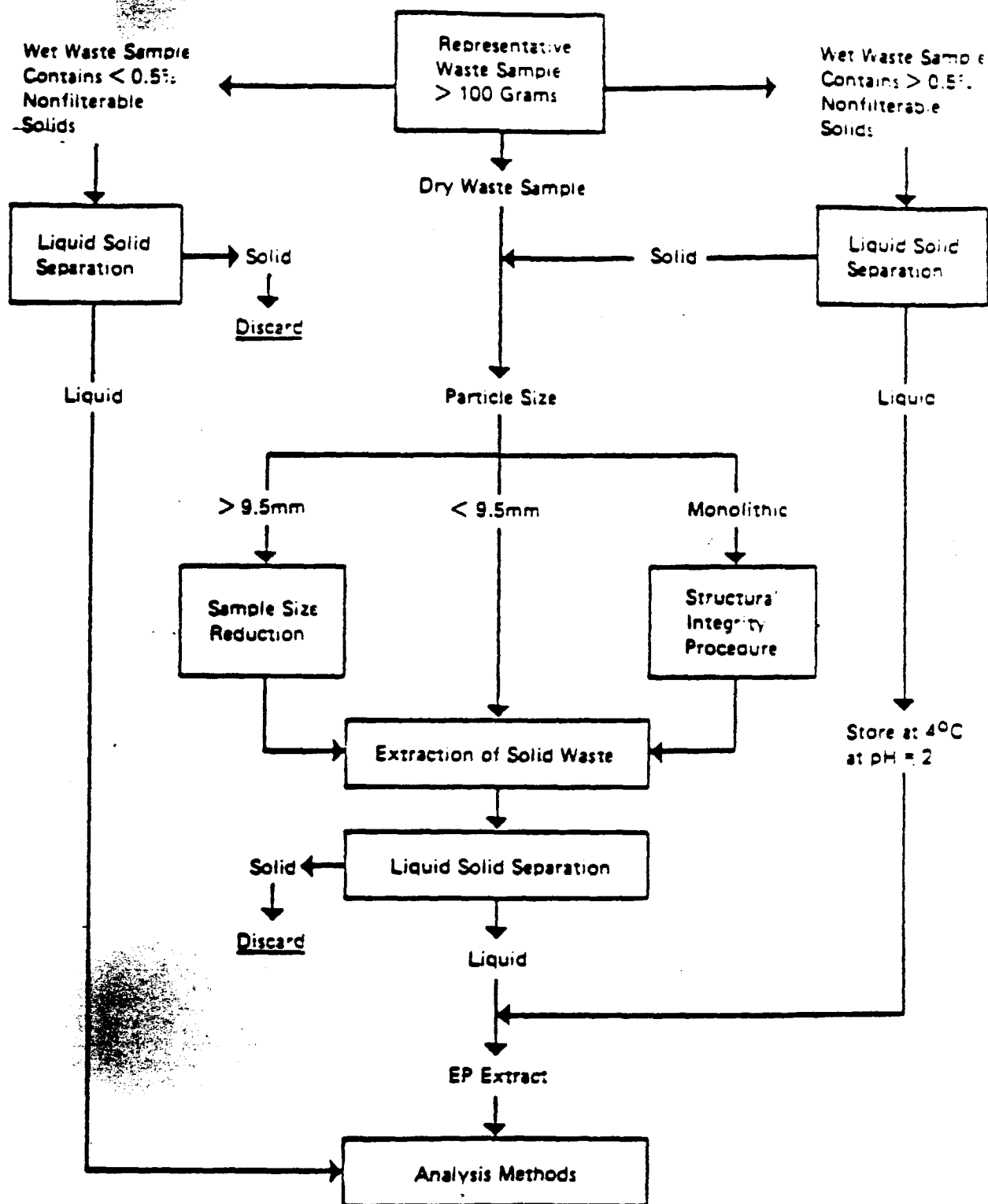
#### 2. Structural Integrity Procedure/Particle Size Reduction

Prior to extraction, the solid material must pass through a 9.5-mm (0.375-in.) standard sieve, have a surface area per g of waste of 3.1 cm<sup>2</sup>, or, if it consists of a single piece, be subjected to the Structural Integrity Procedure. The Structural Integrity Procedure is used to demonstrate the ability of the waste to remain intact after disposal. If the waste does not meet one of these conditions, it must be ground to pass the 9.5-mm sieve.

#### 3. Extraction of Solid Material

The solid material from Step 2 is extracted for 24 hours in an aqueous medium whose pH is maintained at or below 5 with 0.5N acetic acid. The pH is maintained either automatically or manually. (In acidifying to pH 5, no more than 4.0 g of acid solution per g of material being extracted may be used.)

FIGURE 3.  
EXTRACTION PROCEDURE FLOWCHART



#### 4. Final Separation of the Extraction from the Remaining Solid

After extraction, the liquid:solid ratio is adjusted to 20:1, and the mixed solid and extraction liquid are separated by filtration. The solid is discarded and the liquid combined with any filtrate obtained in Step 1. This is the EP Extract that is analyzed and compared with the threshold listed in Table 1 of 40 CFR 261.24.

#### 5. Testing (Analysis) of EP Extract

Inorganic and organic species are identified and quantified using the appropriate methods in the 7000 and 8000 series of methods in this manual.

#### 7.4.3 Regulatory Definition

A solid waste exhibits the characteristic of EP toxicity if, using the appropriate test methods described in this manual or equivalent methods approved by the Administrator under the procedures set forth in 40 CFR 260.20 and 260.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table 7-1 at a concentration greater than or equal to the respective value given in that table. If a waste contains < 0.5% filterable solids, the waste itself, after filtering, is considered to be the extract for the purposes of analysis.

TABLE 7-1.  
MAXIMUM CONCENTRATION OF CONTAMINANTS  
FOR CHARACTERISTIC OF EP TOXICITY

Contaminant	Maximum concentration (mg/L)	Analytical Method
Arsenic	5.0	7060, 7061
Barium	100.0	7080
Cadmium	1.0	7130, 7131
Total Chromium	5.0	7190, 7191
Lead	5.0	7420, 7421
Mercury	0.2	7470
Selenium	1.0	7740, 7741
Silver	5.0	7760
Endrin (1,2,3,4,10,10-Hexachloro-1 7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1 4-endo,endo-5,8-dimethanonaph- thalene)	0.02	8080
Lindane (1,2,3,4,5,6- Hexachlorocyclohexane, gamma isomer)	0.4	8080
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl)ethane)	10.0	8080
Toxaphene (C <sub>10</sub> H <sub>10</sub> Cl <sub>8</sub> , Technical chlorinated camphene, 67-69% chlorine)	0.5	8080
2,4-D (2,4-Dichlorophenoxyacetic acid)	10.0	8150
2,4,5-TP (Silvex) (2,4,5- Trichlorophenoxypropionic acid)	1.0	8150

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## METHOD 8080

### ORGANOCHLORINE PESTICIDES AND PCBs

#### 1.0 SCOPE AND APPLICATION

1.1 Method 8080 is used to determine the concentration of various organochlorine pesticides and polychlorinated biphenyls (PCBs). Table 1 indicates compounds that may be determined by this method and lists the method detection limit for each compound in reagent water. Table 2 lists the practical quantitation limit (PQL) for other matrices.

#### 2.0 SUMMARY OF METHOD

2.1 Method 8080 provides gas chromatographic conditions for the detection of ppb levels of certain organochlorine pesticides and PCBs. Prior to the use of this method, appropriate sample extraction techniques must be used. Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. A 2- to 5- $\mu$ L sample is injected into a gas chromatograph (GC) using the solvent flush technique, and compounds in the GC effluent are detected by an electron capture detector (ECD) or a halogen-specific detector (HSD).

2.2 The sensitivity of Method 8080 usually depends on the level of interferences rather than on instrumental limitations. If interferences prevent detection of the analytes, Method 8080 may also be performed on samples that have undergone cleanup. Method 3620, Florisil Column Cleanup, by itself or followed by Method 3660, Sulfur Cleanup, may be used to eliminate interferences in the analysis.

#### 3.0 INTERFERENCES

3.1 Refer to Methods 3500 (Section 3.5, in particular), 3600, and 8000.

3.2 Interferences by phthalate esters can pose a major problem in pesticide determinations when using the electron capture detector. These compounds generally appear in the chromatogram as large late-eluting peaks, especially in the 15% and 50% fractions from the Florisil cleanup. Common flexible plastics contain varying amounts of phthalates. These phthalates are easily extracted or leached from such materials during laboratory operations. Cross contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Interferences from phthalates can best be minimized by avoiding contact with any plastic materials. Exhaustive cleanup of reagents and glassware may be required to eliminate background phthalate contamination. The contamination from phthalate esters can be completely eliminated with a microcoulometric or electrolytic conductivity detector.

TABLE 1. GAS CHROMATOGRAPHY OF PESTICIDES AND PCBs<sup>a</sup>

Compound	Retention time (min)		Method Detection limit (ug/L)
	Col. 1	Col. 2	
Aldrin	2.40	4.10	0.004
$\alpha$ -BHC	1.35	1.82	0.003
$\beta$ -BHC	1.90	1.97	0.006
$\delta$ -BHC	2.15	2.20	0.009
$\gamma$ -BHC (Lindane)	1.70	2.13	0.004
Chlordane (technical)	e	e	0.014
4,4'-DDD	7.83	9.08	0.011
4,4'-DDE	5.13	7.15	0.004
4,4'-DDT	9.40	11.75	0.012
Dieldrin	5.45	7.23	0.002
Endosulfan I	4.50	6.20	0.014
Endosulfan II	8.00	8.28	0.004
Endosulfan sulfate	14.22	10.70	0.056
Endrin	6.55	8.10	0.006
Endrin aldehyde	11.82	9.30	0.023
Heptachlor	2.00	3.35	0.003
Heptachlor epoxide	3.50	5.00	0.083
Methoxychlor	18.20	26.60	0.176
Toxaphene	e	e	0.24
PCB-1016	e	e	nd
PCB-1221	e	e	nd
PCB-1232	e	e	nd
PCB-1242	e	e	0.065
PCB-1248	e	e	nd
PCB-1254	e	e	nd
PCB-1260	e	e	nd

<sup>a</sup>U.S. EPA. Method 617. Organochloride Pesticides and PCBs.  
Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

e = Multiple peak response.

nd = not determined.

TABLE 2. DETERMINATION OF PRACTICAL QUANTITATION LIMITS (PQL) FOR VARIOUS MATRICES<sup>a</sup>

Matrix	Factor <sup>b</sup>
Ground water	10
Low-level soil by sonication with GPC cleanup	670
High-level soil and sludges by sonication	10,000
Non-water miscible waste	100,000

<sup>a</sup>Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

<sup>b</sup>PQL = [Method detection limit (Table 1)] X [Factor (Table 2)]. For non-aqueous samples, the factor is on a wet-weight basis.



## 4.0 APPARATUS AND MATERIALS

### 4.1 Gas chromatograph:

4.1.1 Gas Chromatograph: Analytical system complete with gas chromatograph suitable for on-column injections and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak heights and/or peak areas is recommended.

#### 4.1.2 Columns:

4.1.2.1 Column 1: Supelcoport (100/120 mesh) coated with 1.5% SP-2250/1.95% SP-2401 packed in a 1.8-m x 4-mm I.D. glass column or equivalent.

4.1.2.2 Column 2: Supelcoport (100/120 mesh) coated with 3% OV-1 in a 1.8-m x 4-mm I.D. glass column or equivalent.

4.1.3 Detectors: Electron capture (ECD) or halogen specific (HSD) (i.e., electrolytic conductivity detector).

### 4.2 Kuderna-Danish (K-D) apparatus:

4.2.1 Concentrator tube: 10-mL, graduated (Kontes K-570050-1025 or equivalent). Ground-glass stopper is used to prevent evaporation of extracts

4.2.2 Evaporation flask: 500-mL (Kontes K-570001-500 or equivalent). Attach to concentrator tube with springs.

4.2.3 Snyder column: Three-ball macro (Kontes K-503000-0121 or equivalent).

4.2.4 Snyder column: Two-ball micro (Kontes K-569001-0219 or equivalent).

4.3 Boiling chips: Solvent extracted, approximately 10/40 mesh (silicon carbide or equivalent).

4.4 Water bath: Heated, with concentric ring cover, capable of temperature control ( $\pm 5^{\circ}\text{C}$ ). The bath should be used in a hood.

4.5 Volumetric flasks: 10-, 50-, and 100-mL, ground-glass stopper.

4.6 Microsyringe: 10-uL.

4.7 Syringe: 5-mL.

4.8 Vials: Glass, 2-, 10-, and 20-mL capacity with Teflon-lined screw cap.

## 5.0 REAGENTS

5.1 Solvents: Hexane, acetone, toluene, isooctane (2,2,4-trimethylpentane) (pesticide quality or equivalent).

### 5.2 Stock standard solutions:

5.2.1 Prepare stock standard solutions at a concentration of 1.00 ug/uL by dissolving 0.0100 g of assayed reference material in isooctane and diluting to volume in a 10-mL volumetric flask. A small volume of toluene may be necessary to put some pesticides in solution. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

5.2.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4°C and protect from light. Stock standards should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.2.3 Stock standard solutions must be replaced after one year, or sooner if comparison with check standards indicates a problem.

5.3 Calibration standards: Calibration standards at a minimum of five concentration levels for each parameter of interest are prepared through dilution of the stock standards with isooctane. One of the concentration levels should be at a concentration near, but above, the method detection limit. The remaining concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC. Calibration solutions must be replaced after six months, or sooner, if comparison with check standards indicates a problem.

5.4 Internal standards (if internal standard calibration is used): To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

5.4.1 Prepare calibration standards at a minimum of five concentration levels for each analyte of interest as described in Paragraph 5.3.

5.4.2 To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with isooctane.

5.4.3 Analyze each calibration standard according to Section 7.0.

5.5 Surrogate standards: The analyst should monitor the performance of the extraction, cleanup (when used), and analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and reagent water blank with pesticide surrogates. Because GC/ECD data are much more subject to interference than GC/MS, a secondary surrogate is to be used when sample interference is apparent. Dibutyl-chlorendate (DBC) is also subject to acid and base degradation. Therefore, two surrogate standards are added to each sample; however, only one need be calculated for recovery. DBC is the primary surrogate and should be used whenever possible. However, if DBC recovery is low or compounds interfere with DBC, then the 2,4,5,6-tetrachloro-meta-xylene should be evaluated for acceptance. Proceed with corrective action when both surrogates are out of limits for a sample (Section 8.3). Method 3500, Section 5.3.2, indicates the proper procedure for preparing these surrogates.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Section 4.1. Extracts must be stored under refrigeration and analyzed within 40 days of extraction.

## 7.0 PROCEDURE

### 7.1 Extraction:

7.1.1 Refer to Chapter Two for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a neutral, or as is, pH with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using either Method 3540 or 3550.

7.1.2 Prior to gas chromatographic analysis, the extraction solvent must be exchanged to hexane. The exchange is performed during the K-D procedures listed in all of the extraction methods. The exchange is performed as follows.

7.1.2.1 Following K-D of the methylene chloride extract to 1 mL using the macro-Snyder column, allow the apparatus to cool and drain for at least 10 min.

7.1.2.2 Increase the temperature of the hot water bath to about 90°C. Momentarily remove the Snyder column, add 50 mL of hexane, a new boiling chip, and reattach the macro-Snyder column. Concentrate the extract using 1 mL of hexane to prewet the Snyder column. Place the K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

7.1.2.3 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1-2 mL of hexane. A 5-mL syringe is recommended for this operation. Adjust the extract volume to 10.0 mL. Stopper the concentrator tube and store refrigerated at 4°C, if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. Proceed with gas chromatographic analysis if further cleanup is not required.

## 7.2—Gas chromatography conditions (Recommended):

7.2.1 Column 1: Set 5% methane/95% argon carrier gas flow at 60 mL/min flow rate. Column temperature is set at 200°C isothermal. When analyzing for the low molecular weight PCBs (PCB 1221-PCB 1248), it is advisable to set the oven temperature to 160°C.

7.2.2 Column 2: Set 5% methane/95% argon carrier gas flow at 60 mL/min flow rate. Column temperature held isothermal at 200°C. When analyzing for the low molecular weight PCBs (PCB 1221-PCB 1248), it is advisable to set the oven temperature to 140°C.

7.2.3 When analyzing for most or all of the analytes in this method, adjust the oven temperature and column gas flow so that 4,4'-DDT has a retention time of approximately 12 min.

7.3 Calibration: Refer to Method 8000 for proper calibration techniques. Use Table 1 and especially Table 2 for guidance on selecting the lowest point on the calibration curve.

7.3.1 The procedure for internal or external calibration may be used. Refer to Method 8000 for a description of each of these procedures.

7.3.2 Because of the low concentration of pesticide standards injected on a GC/ECD, column adsorption may be a problem when the GC has not been used for a day. Therefore, the GC column should be primed or deactivated by injecting a PCB or pesticide standard mixture approximately 20 times more concentrated than the mid-level standard. Inject this prior to beginning initial or daily calibration.

## 7.4 Gas chromatographic analysis:

7.4.1 Refer to Method 8000. If the internal standard calibration technique is used, add 10 uL of internal standard to the sample prior to injection.

7.4.2 Follow Section 7.6 in Method 8000 for instructions on the analysis sequence, appropriate dilutions, establishing daily retention time windows, and identification criteria. Include a mid-level standard after each group of 10 samples in the analysis sequence.

7.4.3 Examples of GC/ECD chromatograms for various pesticides and PCBs are shown in Figures 1 through 5.

7.4.4 Prime the column as per Paragraph 7.3.2.

7.4.5 DDT and endrin are easily degraded in the injection port if the injection port or front of the column is dirty. This is the result of buildup of high boiling residue from sample injection. Check for degradation problems by injecting a mid-level standard containing only 4,4'-DDT and endrin. Look for the degradation products of 4,4'-DDT (4,4'-DDE and 4,4'-DDD) and endrin (endrin ketone and endrin aldehyde). If degradation of either DDT or endrin exceeds 20%, take corrective action before proceeding with calibration, by following the GC system maintenance outlined in Section 7.7 of Method 8000. Calculate percent breakdown as follows:

$$\% \text{ breakdown for 4,4'-DDT} = \frac{\text{Total DDT degradation peak area (DDE + DDD)}}{\text{Total DDT peak area (DDT + DDE + DDD)}} \times 100$$

% breakdown  
for Endrin =

$$\frac{\text{Total endrin degradation peak area (endrin aldehyde + endrin ketone)}}{\text{Total endrin peak area (endrin + endrin aldehyde + endrin ketone)}} \times 100$$

7.4.6 Record the sample volume injected and the resulting peak sizes (in area units or peak heights).

7.4.7 Using either the internal or external calibration procedure (Method 8000), determine the identity and quantity of each component peak in the sample chromatogram which corresponds to the compounds used for calibration purposes.

7.4.8 If peak detection and identification are prevented due to interferences, the hexane extract may need to undergo cleanup using Method 3620. The resultant extract(s) may be analyzed by GC directly or may undergo further cleanup to remove Sulfur using Method 3660.

## 7.5 Cleanup:

7.5.1 Proceed with Method 3620, followed by, if necessary, Method 3660, using the 10-mL hexane extracts obtained from Paragraph 7.1.2.3.

7.5.2 Following cleanup, the extracts should be analyzed by GC, as described in the previous paragraphs and in Method 8000.

## 7.6 Calculations (exerpted from U.S. FDA, PAM):

7.6.1 Calculation of Certain Residues: Residues which are mixtures of two or more components present problems in measurement. When they are found together, e.g., toxaphene and DDT, the problem of quantitation becomes even more difficult. In the following sections suggestions are offered for handling toxaphene, chlordane, PCB, DDT, and BHC. A column 10% DC-200 stationary phase was used to obtain the chromatograms in Figures 6-9.

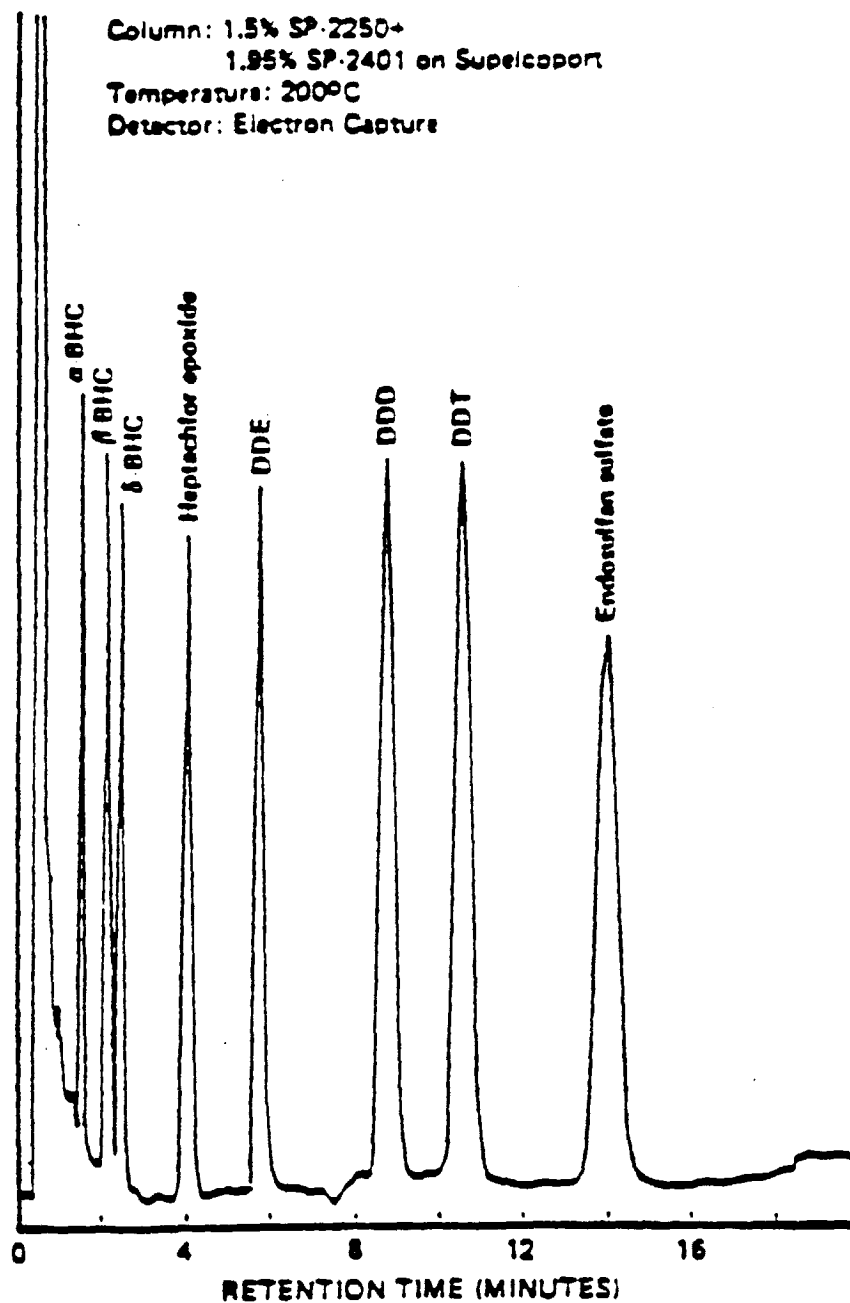


Figure 1. Gas chromatogram of pesticides.

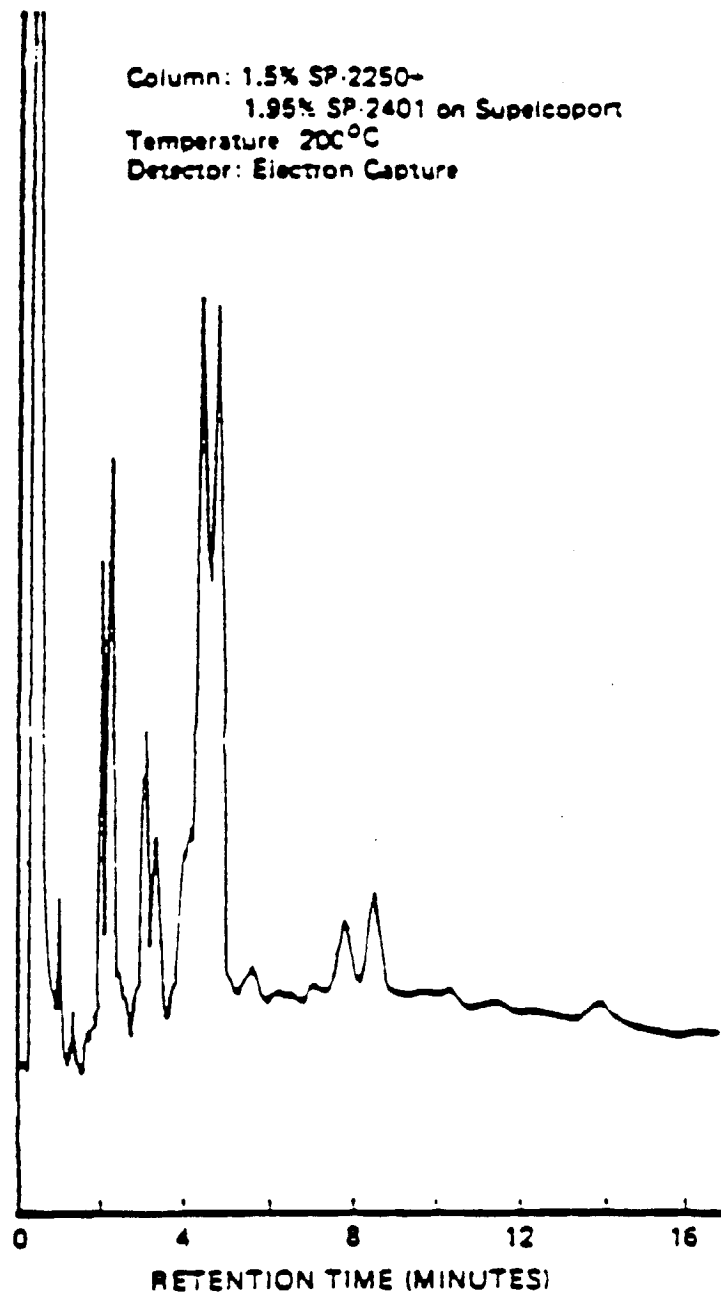


Figure 2. Gas chromatogram of chlordane.

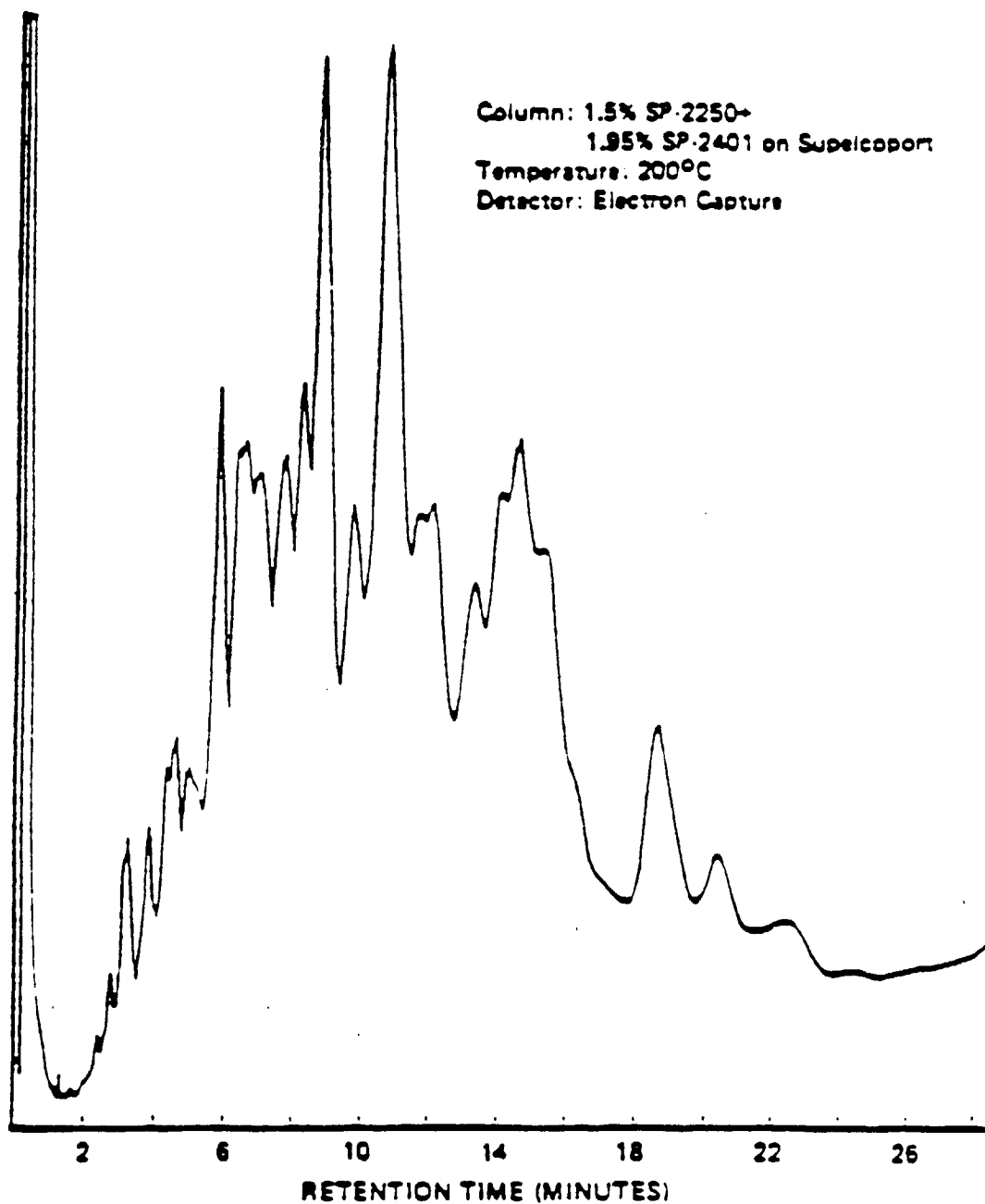


Figure 3. Gas chromatogram of toxaphene.



Column: 1.5% SP-2250-  
1.95% SP-2401 on Supelcoport  
Temperature: 200°C  
Detector: Electron Capture

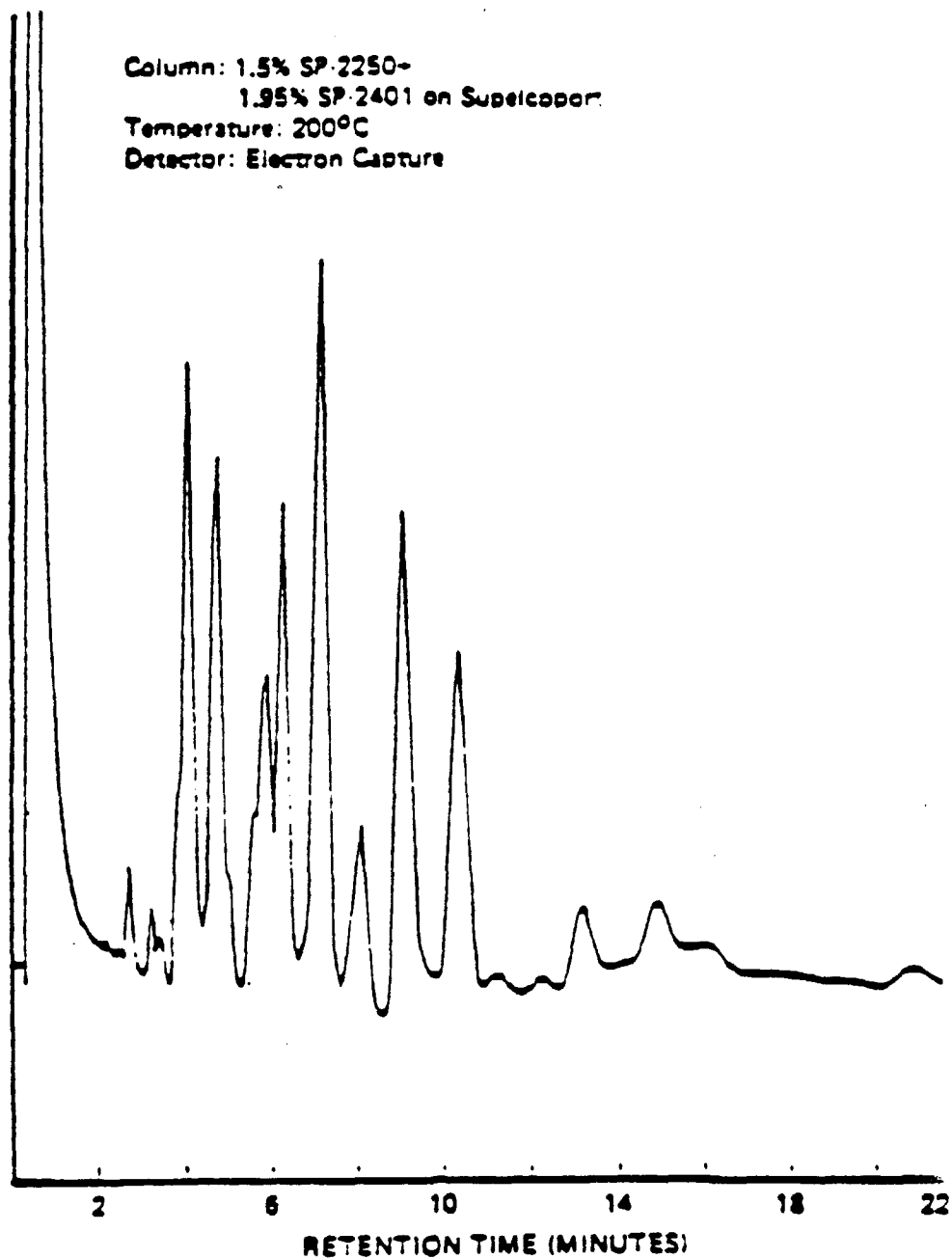


Figure 4. Gas chromatogram of PCB-1254.

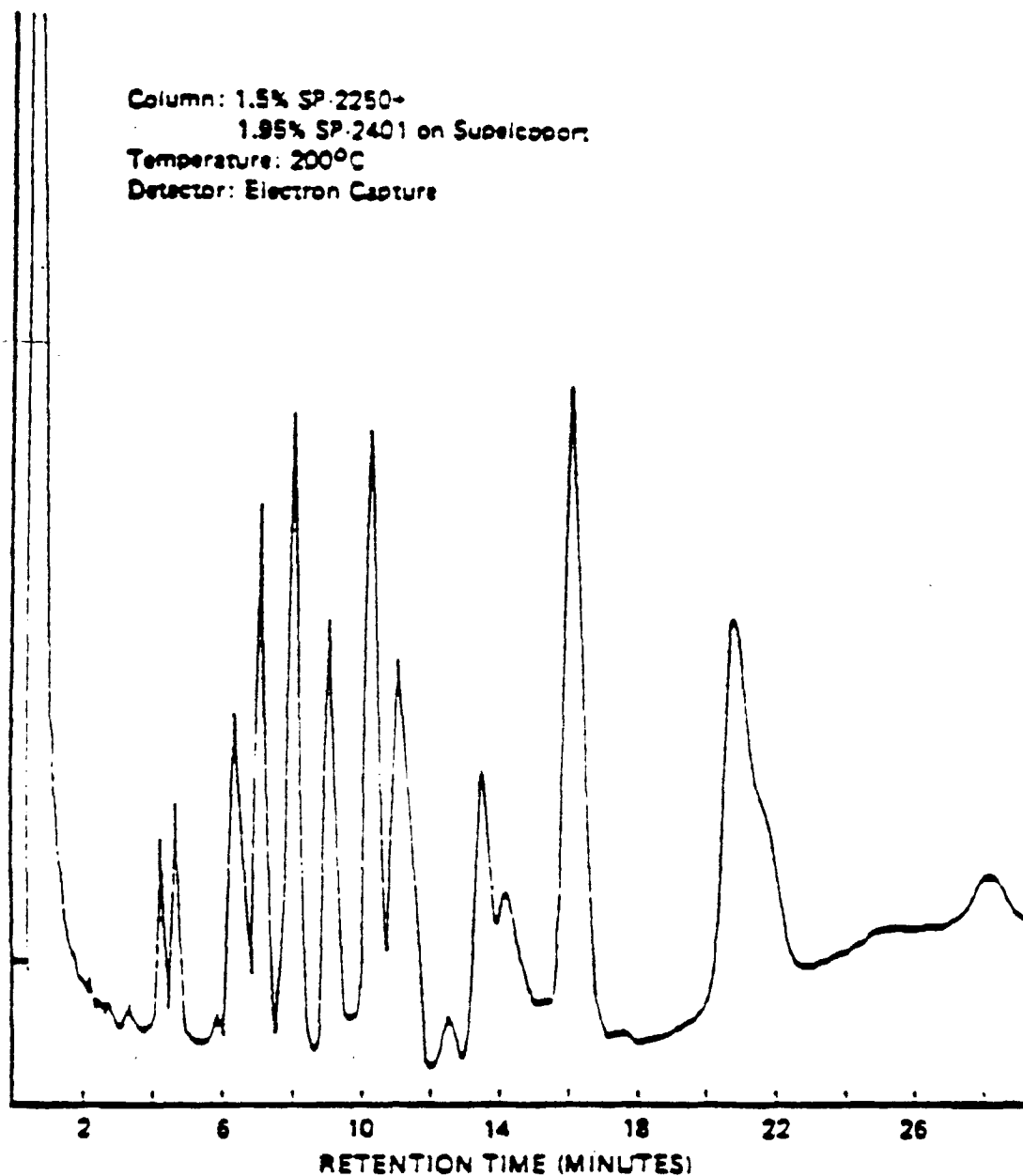


Figure 5. Gas chromatogram of PCB-1260.

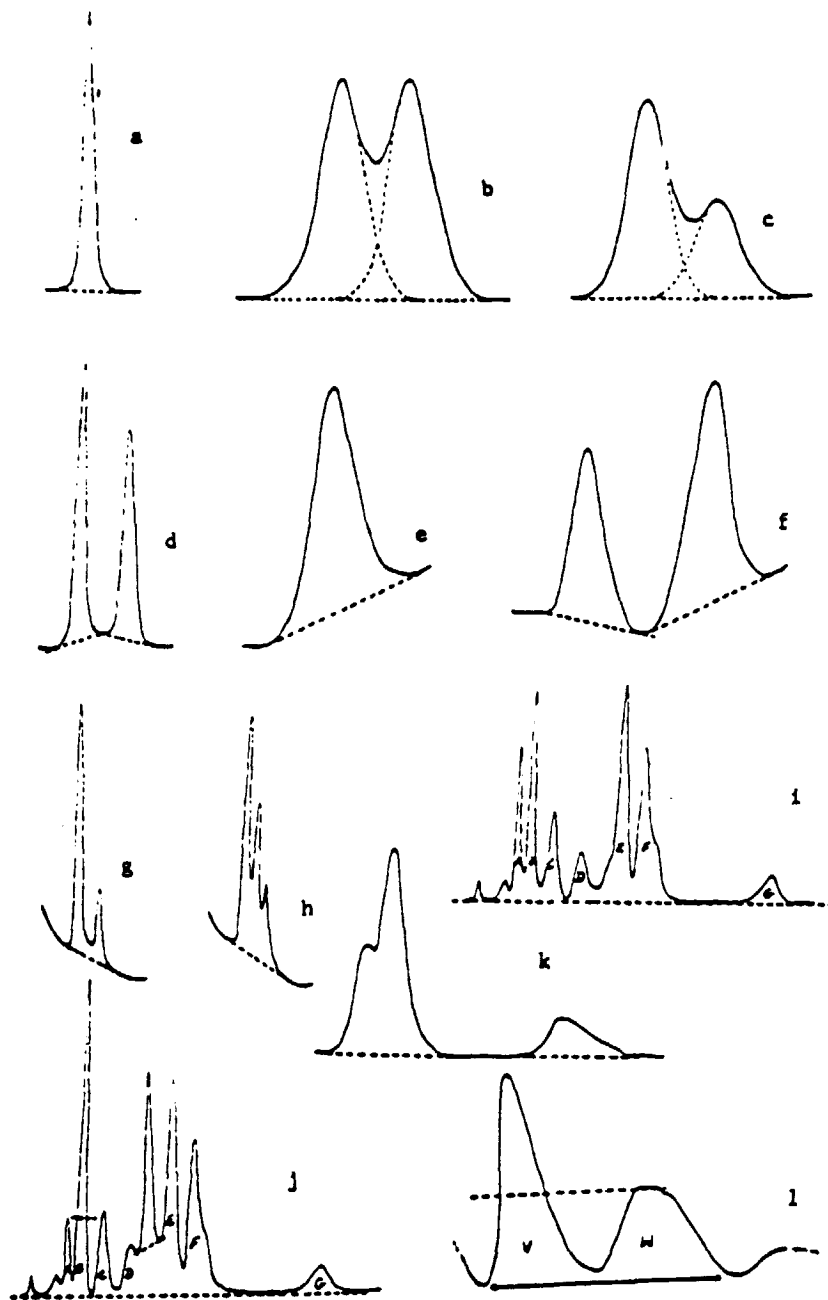


Fig. 6--Baseline construction for some typical gas chromatographic peaks. a, symmetrical separated flat baseline; b and c, overlapping flat baseline; d, separated (pen does not return to baseline between peaks); e, separated sloping baseline; f, separated (pen goes below baseline between peaks); g,  $\alpha$ - and  $\gamma$ -BHC sloping baseline; h,  $\alpha$ -,  $\beta$ -, and  $\gamma$ -BHC sloping baseline; i, chlordane flat baseline; j, heptachlor and heptachlor epoxide superimposed on chlordane; k, chair-shaped peaks, unsymmetrical peak; l,  $p,p'$ -DDT superimposed on toxaphene.

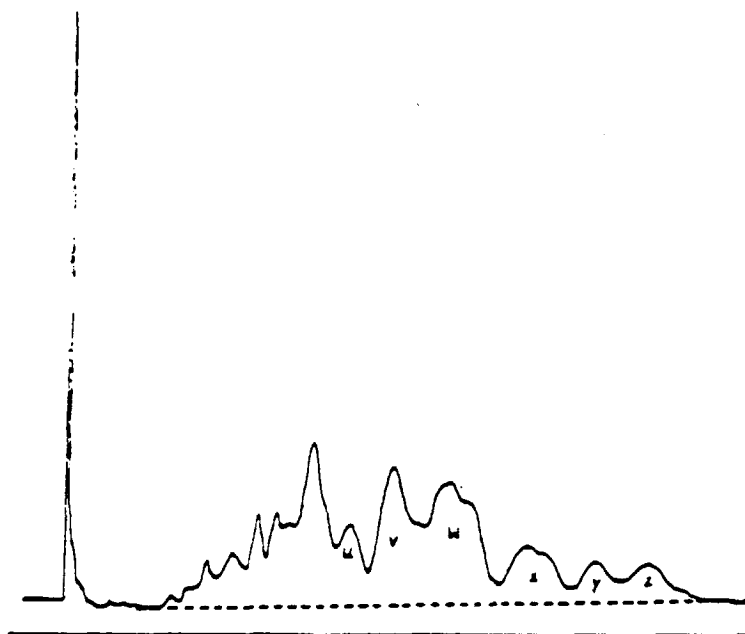


Fig. 7a--Baseline construction for multiple residues with standard toxaphene.

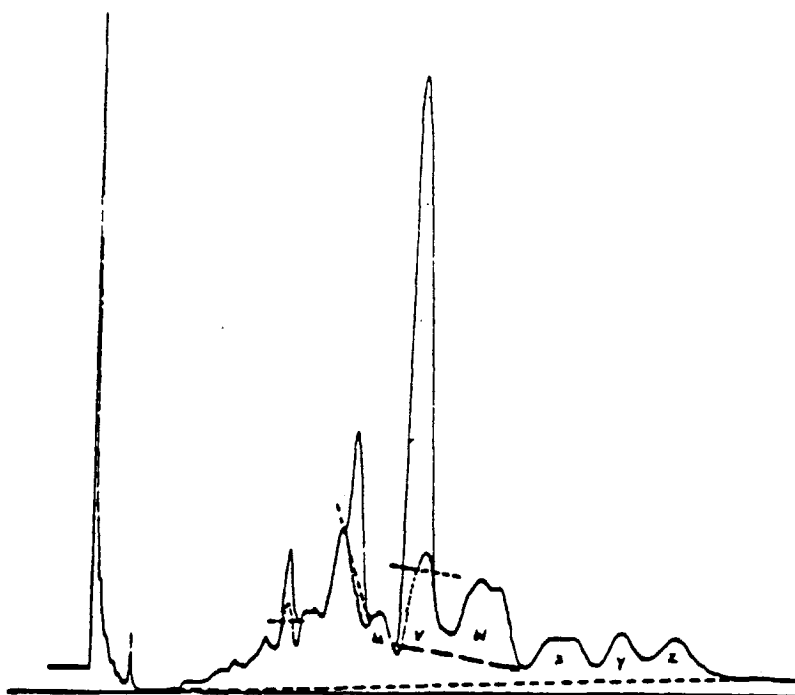


Fig. 7b--Baseline construction for multiple residues with toxaphene, DOE and o,p'-, and p,p'-DDT.

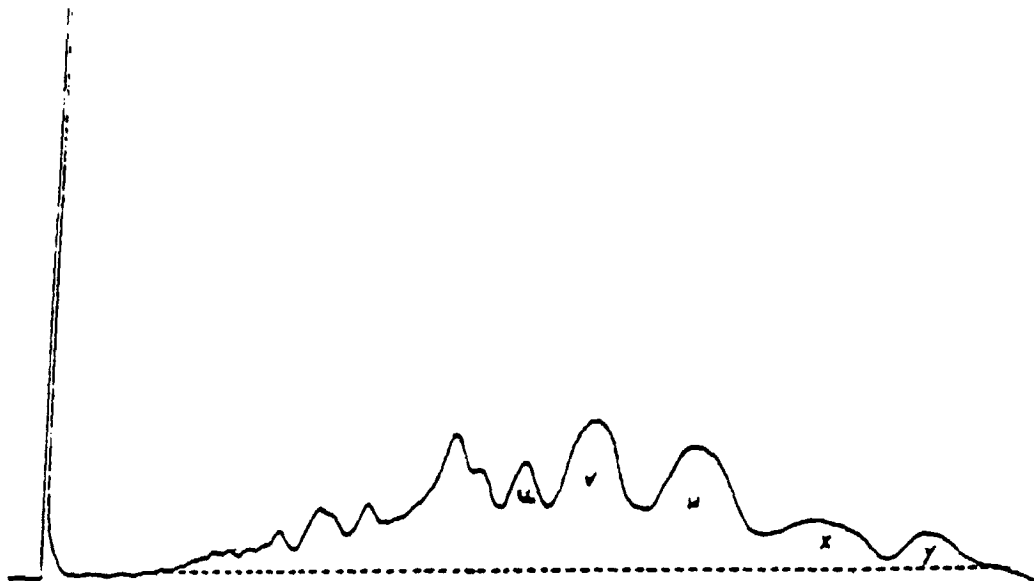


Fig. 8a--Baseline construction for multiple residues: standard toxaphene.

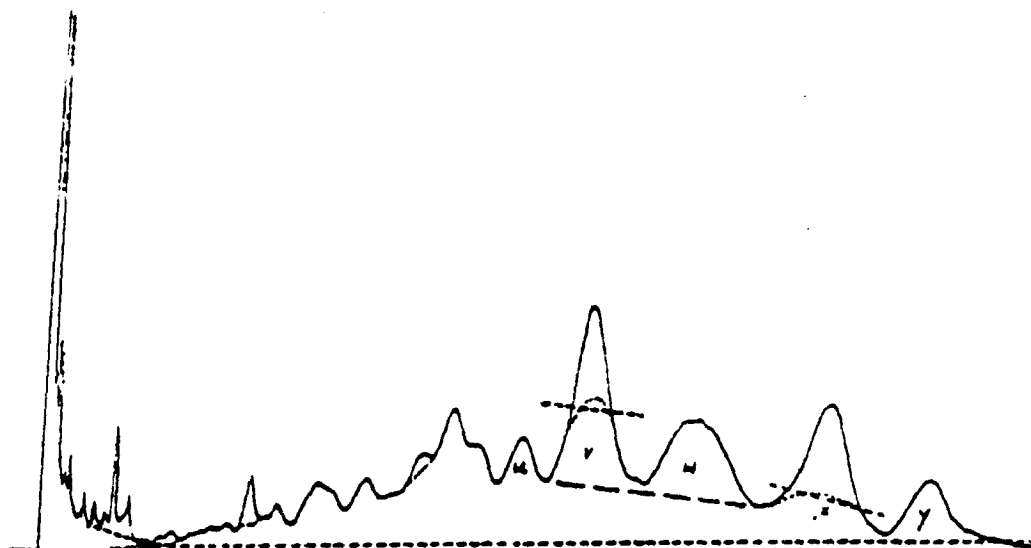


Fig. 8b--Baseline construction for multiple residues: rice bran with BHC, toxaphene, DDT, and methoxychlor.

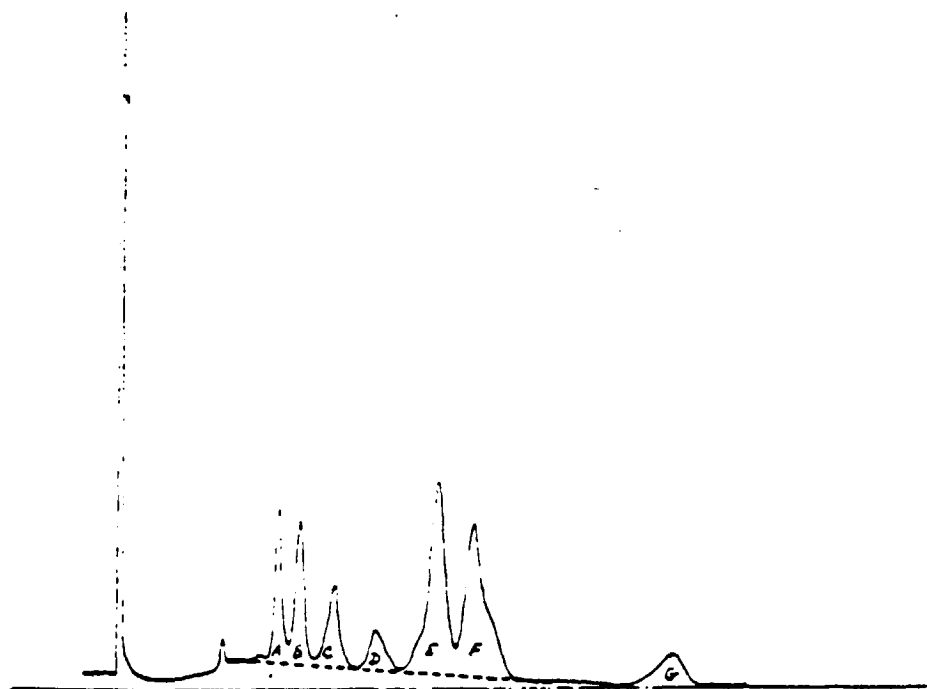


Fig. 9a--Baseline construction for multiple residues: standard chlordane.

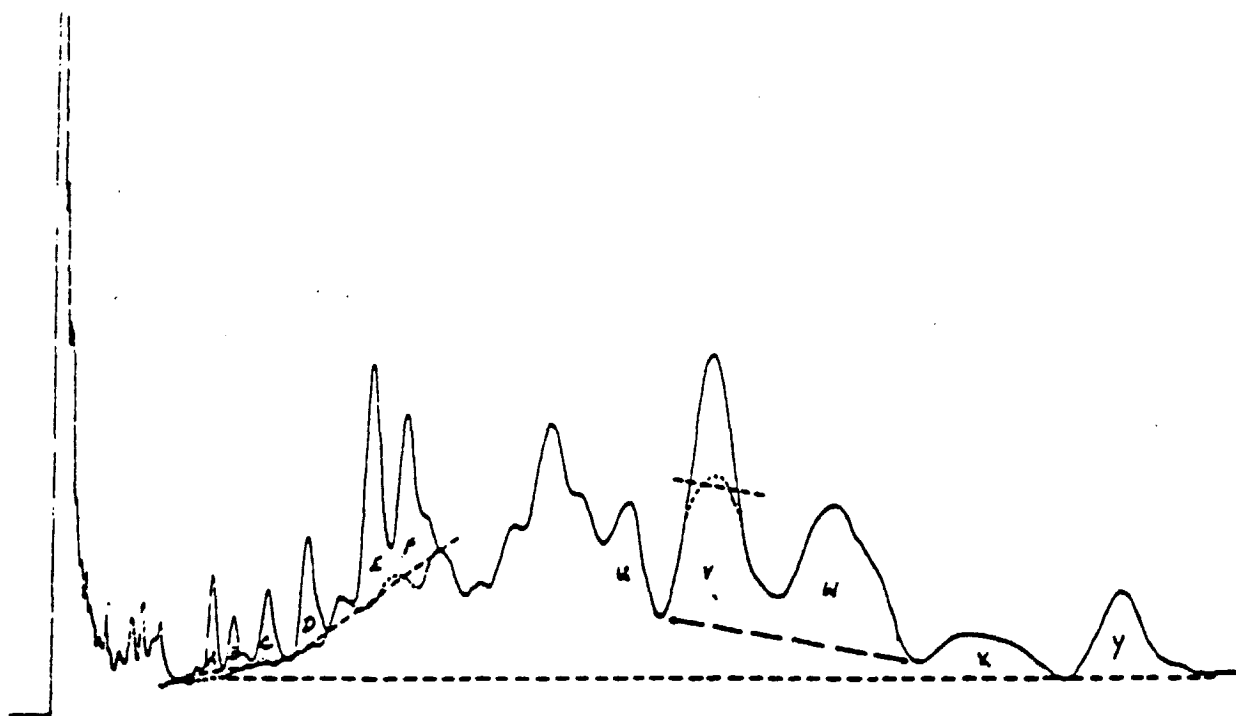


Fig. 9b--Baseline construction for multiple residues: rice bran with chlordane, toxaphene, and DDT.

7.6.2 Toxaphene: Quantitative calculation of toxaphene or Strobane is difficult, but reasonable accuracy can be obtained. To calculate toxaphene on GC/ECD: (a) adjust sample size so that toxaphene major peaks are 10-30% full-scale deflection (FSD); (b) inject a toxaphene standard that is estimated to be within  $\pm 10$  ng of the sample; (c) construct the baseline of standard toxaphene between its extremities; and (d) construct the baseline under the sample, using the distances of the peak troughs to baseline on the standard as a guide (Figures 7, 8, and 9). This procedure is made difficult by the fact that the relative heights and widths of the peaks in the sample will probably not be identical to the standard. A toxaphene standard that has been passed through a Florisil column will show a shorter retention time for peak X and an enlargement of peak Y.

7.6.3 Toxaphene and DDT: If DDT is present, it will superimpose itself on toxaphene peak V. To determine the approximate baseline of the DDT, draw a line connecting the trough of peaks U and V with the trough of peaks W and X and construct another line parallel to this line which will just cut the top of peak W (Figure 6l). This procedure was tested with ratios of standard toxaphene-DDT mixtures from 1:10 to 2:1 and the results of added and calculated DDT and toxaphene by the "parallel lines" method of baseline construction were within 10% of the actual values in all cases.

7.6.3.1 A series of toxaphene residues have been calculated using total peak area for comparison to the standard and also using area of the last four peaks only in both sample and standard. The agreement between the results obtained by the two methods justifies the use of the latter method for calculating toxaphene in a sample where the early eluting portion of the toxaphene chromatogram is interfered with by other substances.

7.6.3.2 The baseline for methoxychlor superimposed on toxaphene (Figure 8b) was constructed by overlaying the samples on a toxaphene standard of approximately the same concentration (Figure 8a) and viewing the charts against a lighted background.

7.6.4 Chlordane is a technical mixture of at least 11 major components and 30 or more minor ones. Gas chromatography-mass spectrometry and nuclear magnetic resonance analytical techniques have been applied to the elucidation of the chemical structures of the many chlordane constituents. Figure 9a is a chromatogram of standard chlordane. Peaks E and F are responses to trans- and cis-chlordane, respectively. These are the two major components of technical chlordane, but the exact percentage of each in the technical material is not completely defined and is not consistent from batch to batch. Other labelled peaks in Figure 9a are thought to represent: A, monochlorinated adduct of pentachlorocyclopentadiene with cyclopentadiene; B, coelution of heptachlor and  $\alpha$ -chlordene; C, coelution of  $\beta$ -chlordene and  $\gamma$ -chlordene;

D, a chlordane analog; G, coelution of cis-nonachlor and "Compound K," a chlordane isomer. The right "shoulder" of peak F is caused by trans-nonachlor.

7.6.4.1 The GC pattern of a chlordane residue may differ considerably from that of the technical standard. Depending on the sample substrate and its history, residues of chlordane can consist of almost any combination of: constituents from the technical chlordane; plant and/or animal metabolites; and products of degradation caused by exposure to environmental factors such as water and sunlight. Only limited information is available on which residue GC patterns are likely to occur in which samples types, and even this information may not be applicable to a situation where the route of exposure is unusual. For example, fish exposed to a recent spill of technical chlordane will contain a residue drastically different from a fish whose chlordane residue was accumulated by ingestion of smaller fish or of vegetation, which in turn had accumulated residues because chlordane was in the water from agricultural runoff.

7.6.4.2 Because of this inability to predict a chlordane residue GC pattern, it is not possible to prescribe a single method for the quantitation of chlordane residues. The analyst must judge whether or not the residue's GC pattern is sufficiently similar to that of a technical chlordane reference material to use the latter as a reference standard for quantitation.

7.6.4.3 When the chlordane residue does not resemble technical chlordane, but instead consists primarily of individual, identifiable peaks, quantitate each peak separately against the appropriate reference materials and report the individual residues. (Reference materials are available for at least 11 chlordane constituents, metabolites or degradation products which may occur in the residue.)

7.6.4.4 When the GC pattern of the residue resembles that of technical chlordane, quantitate chlordane residues by comparing the total area of the chlordane chromatogram from peaks A through F (Figure 9a) in the sample versus the same part of the standard chromatogram. Peak G may be obscured in a sample by the presence of other pesticides. If G is not obscured, include it in the measurement for both standard and sample. If the heptachlor epoxide peak is relatively small, include it as part of the total chlordane area for calculation of the residue. If heptachlor and/or heptachlor epoxide are much out of proportion as in Figure 6j, calculate these separately and subtract their areas from total area to give a corrected chlordane area. (Note that octachlor epoxide, metabolite of chlordane, can easily be mistaken for heptachlor epoxide on a nonpolar GC column.)



7.6.4.5 To measure the total area of the chlordane chromatogram, proceed as in Section 7.6.2 on toxaphene. Inject an amount of technical chlordane standard which will produce a chromatogram in which peaks E and F are approximately the same size as those in the sample chromatograms. Construct the baseline beneath the standard from the beginning of peak A to the end of peak F as shown in Figure 9a. Use the distance from the trough between peaks E and F to the baseline in the chromatogram of the standard to construct the baseline in the chromatogram of the sample. Figure 9b shows how the presence of toxaphene causes the baseline under chlordane to take an upward angle. When the size of peaks E and F in standard and sample chromatograms are the same, the distance from the trough of the peaks to the baselines should be the same. Measurement of chlordane area should be done by total peak area if possible.

NOTE: A comparison has been made of the total peak area integration method and the addition of peak heights method for several samples containing chlordane. The peak heights A, B, C, D, E, and F were measured in millimeters from peak maximum of each to the baseline constructed under the total chlordane area and were then added together. These results obtained by the two techniques are too close to ignore this method of "peak height addition" as a means of calculating chlordane. The technique has inherent difficulties because not all the peaks are symmetrical and not all are present in the same ratio in standard and in sample. This method does offer a means of calculating results if no means of measuring total area is practical.

7.6.5 Polychlorinated biphenyls (PCBs): Quantitation of residues of PCB involves problems similar to those encountered in the quantitation of toxaphene, Strobane, and chlordane: in each case, the chemical is made up of numerous compounds and so the chromatograms are multi-peak; also in each case the chromatogram of the residue may not match that of the standard.

7.6.5.1 Mixtures of PCB of various chlorine contents were sold for many years in the U.S. by the Monsanto Co. under the tradename Aroclor (1200 series and 1016). Though these Aroclors are no longer marketed, the PCBs remain in the environment and are sometime found as residues in foods, especially fish.

7.6.5.2 PCB residues are quantitated by comparison to one or more of the Aroclor materials, depending on the chromatographic pattern of the residue. A choice must be made as to which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue. This may also involve a judgment about what proportion of the different Aroclors to combine to produce the appropriate reference material.

7.6.5.3 Quantitate PCB residues by comparing total area or height of residue peaks to total area or height of peaks from appropriate Aroclor(s) reference materials. Measure total area or height response from common baseline under all peaks. Use only those peaks from sample that can be attributed to chlorobiphenyls. These peaks must also be present in chromatogram of reference materials. Mixture of Aroclors may be required to provide best match of GC patterns of sample and reference.

7.6.6 DDT: DDT found in samples often consists of both o,p'- and p,p'-DDT. Residues of DDE and TDE are also frequently present. Each isomer of DDT and its metabolites should be quantitated using the pure standard of that compound and reported as such.

7.6.7 Hexachlorocyclohexane (BHC, from the former name, benzene hexachloride): Technical grade BHC is a cream-colored amorphous solid with a very characteristic musty odor; it consists of a mixture of six chemically distinct isomers and one or more heptachloro-cyclohexanes and octachloro-cyclohexanes.

7.6.7.1 Commercial BHC preparations may show a wide variance in the percentage of individual isomers present. The elimination rate of the isomers fed to rats was 3 weeks for the  $\alpha$ -,  $\gamma$ -, and  $\delta$ -isomers and 14 weeks for the  $\beta$ -isomer. Thus it may be possible to have any combination of the various isomers in different food commodities. BHC found in dairy products usually has a large percentage of  $\beta$ -isomer.

7.6.7.2 Individual isomers ( $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$ ) were injected into gas chromatographs equipped with flame ionization, microcoulometric, and electron capture detectors. Response for the four isomers is very nearly the same whether flame ionization or microcoulometric GLC is used. The  $\alpha$ -,  $\gamma$ -, and  $\delta$ -isomers show equal electron affinity.  $\beta$ -BHC shows a much weaker electron affinity compared to the others isomers.

7.6.7.3 Quantitate each isomer ( $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$ ) separately against a standard of the respective pure isomer, using a GC column which separates all the isomers from one another.

## 8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures. Quality control to validate sample extraction is covered in Method 3500 and in the extraction method utilized. If extract cleanup was performed, follow the QC in Method 3600 and in the specific cleanup method.

8.2 Mandatory quality control to evaluate the GC system operation is found in Method 8000, Section 8.6.

8.2.1 The quality control check sample concentrate (Method 8000, Section 8.6) should contain each single-component parameter of interest at the following concentrations in acetone: 4,4'-DDD, 10 ug/mL; 4,4'-DDT, 10 ug/mL; endosulfan II, 10 ug/mL; endosulfan sulfate, 10 ug/mL; endrin, 10ug/mL; and any other single-component pesticide, 2 ug/mL. If this method is only to be used to analyze for PCBs, chlordane, or toxaphene, the QC check sample concentrate should contain the most representative multi-component parameter at a concentration of 50 ug/mL in acetone.

8.2.2 Table 3 indicates the calibration and QC acceptance criteria for this method. Table 4 gives method accuracy and precision as functions of concentration for the analytes of interest. The contents of both Tables should be used to evaluate a laboratory's ability to perform and generate acceptable data by this method.

8.3 Calculate surrogate standard recovery on all samples, blanks, and spikes. Determine if the recovery is within limits (limits established by performing QC procedures outlined in Method 8000, Section 8.10).

8.3.1 If recovery is not within limits, the following is required.

- Check to be sure there are no errors in calculations, surrogate solutions and internal standards. Also, check instrument performance.
- Recalculate the data and/or reanalyze the extract if any the above checks reveal a problem.
- Reextract and reanalyze the sample if none of the above are a problem or flag the data as "estimated concentration."

8.4 GC/MS confirmation: Any compounds confirmed by two columns may also be confirmed by GC/MS if the concentration is sufficient for detection by GC/MS as determined by the laboratory generated detection limits.

8.4.1 The GC/MS would normally require a minimum concentration of 10 ng/uL in the final extract, for each single-component compound.

8.4.2 The pesticide extract and associated blank should be analyzed by GC/MS as per Section 7.0 of Method 8270.

8.4.3 The confirmation may be from the GC/MS analysis of the base/neutral-acid extractables extracts (sample and blank). However, if the compounds are not detected in the base/neutral-acid extract even though the concentration is high enough, a GC/MS analysis of the pesticide extract should be performed.

8.4.4 A reference standard of the compound must also be analyzed by GC/MS. The concentration of the reference standard must be at a level that would demonstrate the ability to confirm the pesticides/PCBs identified by GC/ECD.

## 9.0 METHOD PERFORMANCE

9.1 The method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations. Concentrations used in the study ranged from 0.5 to 30 ug/L for single-component pesticides and from 8.5 to 400 ug/L for multi-component parameters. Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships for a flame ionization detector are presented in Table 4.

9.2 The accuracy and precision obtained will be determined by the sample matrix, sample-preparation technique, optional cleanup techniques, and calibration procedures used.

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TABLE 3. QC ACCEPTANCE CRITERIA<sup>a</sup>

Parameter	Test conc. (ug/L)	Limit for s (ug/L)	Range for $\bar{X}$ (ug/L)	Range P, P <sub>s</sub> (%)
Aldrin	2.0	0.42	1.08-2.24	42-122
$\alpha$ -BHC	2.0	0.48	.98-2.44	37-134
$\beta$ -BHC	2.0	0.64	0.78-2.60	17-147
$\delta$ -BHC	2.0	0.72	1.01-2.37	19-140
$\gamma$ -BHC	2.0	0.46	0.86-2.32	32-127
Chlordane	50	10.0	27.6-54.3	45-119
4,4'-DDD	10	2.8	4.8-12.6	31-141
4,4'-DDE	2.0	0.55	1.08-2.60	30-145
4,4'-DDT	10	3.6	4.6-13.7	25-160
Dieldrin	2.0	0.76	1.15-2.49	36-146
Endosulfan I	2.0	0.49	1.14-2.82	45-153
Endosulfan II	10	6.1	2.2-17.1	D-202
Endosulfan Sulfate	10	2.7	3.8-13.2	26-144
Endrin	10	3.7	5.1-12.6	30-147
Heptachlor	2.0	0.40	0.86-2.00	34-111
Heptachlor epoxide	2.0	0.41	1.13-2.63	37-142
Toxaphene	50	12.7	27.8-55.6	41-126
PCB-1016	50	10.0	30.5-51.5	50-114
PCB-1221	50	24.4	22.1-75.2	15-178
PCB-1232	50	17.9	14.0-98.5	10-215
PCB-1242	50	12.2	24.8-69.6	39-150
PCB-1248	50	15.9	29.0-70.2	38-158
PCB-1254	50	13.8	22.2-57.9	29-131
PCB-1260	50	10.4	18.7-54.9	8-127

s = Standard deviation of four recovery measurements, in ug/L.

$\bar{X}$  = Average recovery for four recovery measurements, in ug/L.

P, P<sub>s</sub> = Percent recovery measured.

D = Detected; result must be greater than zero.

<sup>a</sup>Criteria from 40 CFR Part 136 for Method 608. These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 4.

TABLE 4. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION<sup>a</sup>

Parameter	Accuracy, as recovery, $x'$ (ug/L)	Single analyst precision, $s_r'$ (ug/L)	Overall precision, $S'$ (ug/L)
Aldrin	0.81C+0.04	0.16X-0.04	0.20X-0.01
$\alpha$ -BHC	0.84C+0.03	0.13X+0.04	0.23X-0.00
$\beta$ -BHC	0.81C+0.07	0.22X+0.02	0.33X-0.95
$\delta$ -BHC	0.81C+0.07	0.18X+0.09	0.25X+0.03
$\gamma$ -BHC	0.82C-0.05	0.12X+0.06	0.22X+0.04
Chlordane	0.82C-0.04	0.13X+0.13	0.18X+0.18
4,4'-DDD	0.84C+0.30	0.20X-0.18	0.27X-0.14
4,4'-DDE	0.85C+0.14	0.13X+0.06	0.28X-0.09
4,4'-DDT	0.93C-0.13	0.17X+0.39	0.31X-0.21
Dieldrin	0.90C+0.02	0.12X+0.19	0.16X+0.16
Endosulfan I	0.97C+0.04	0.10X+0.07	0.18X+0.08
Endosulfan II	0.93C+0.34	0.41X-0.65	0.47X-0.20
Endosulfan Sulfate	0.89C-0.37	0.13X+0.33	0.24X+0.35
Endrin	0.89C-0.04	0.20X+0.25	0.24X+0.25
Heptachlor	0.69C+0.04	0.06X+0.13	0.16X+0.08
Heptachlor epoxide	0.89C+0.10	0.18X-0.11	0.25X-0.08
Toxaphene	0.80C+1.74	0.09X+3.20	0.20X+0.22
PCB-1016	0.81C+0.50	0.13X+0.15	0.15X+0.45
PCB-1221	0.96C+0.65	0.29X-0.76	0.35X-0.62
PCB-1232	0.91C+10.79	0.21X-1.93	0.31X+3.50
PCB-1242	0.93C+0.70	0.11X+1.40	0.21X+1.52
PCB-1248	0.97C+1.06	0.17X+0.41	0.25X-0.37
PCB-1254	0.76C+2.07	0.15X+1.66	0.17X+3.62
PCB-1260	0.66C+3.76	0.22X-2.37	0.39X-4.86

$x'$  = Expected recovery for one or more measurements of a sample containing a concentration of C, in ug/L.

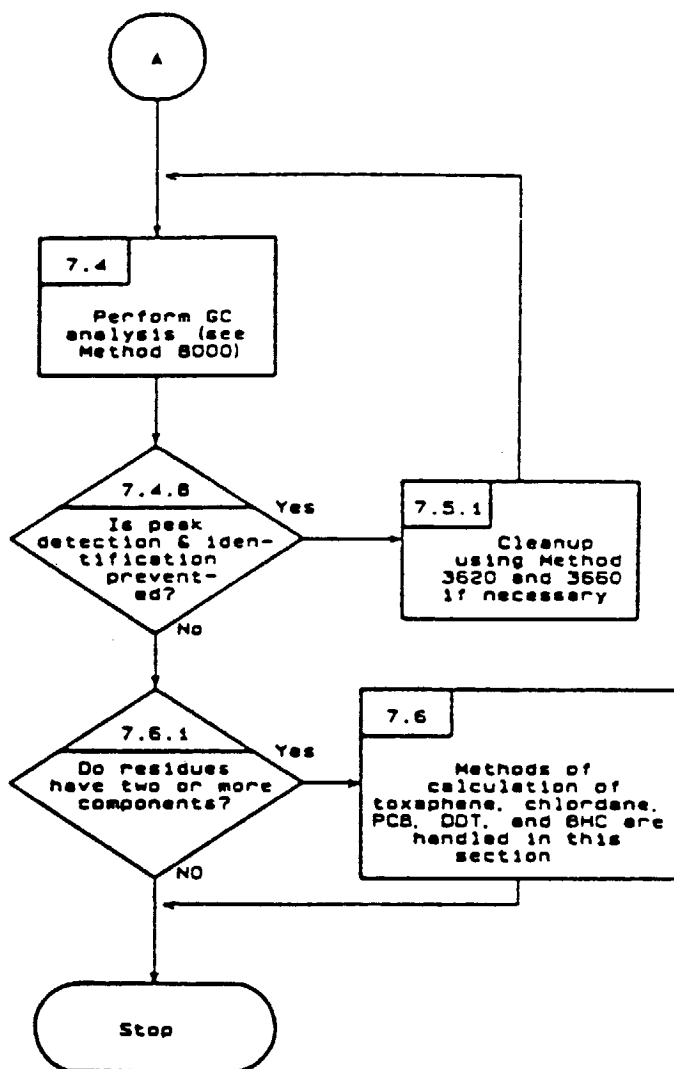
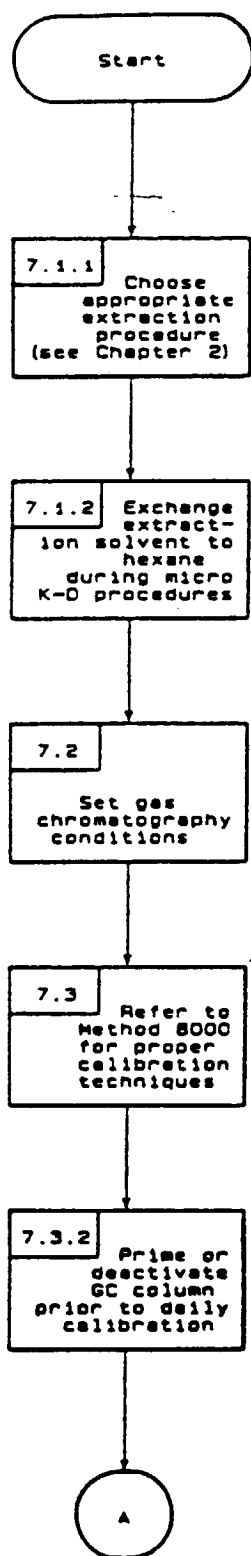
$s_r'$  = Expected single analyst standard deviation of measurements at an average concentration of X, in ug/L.

$S'$  = Expected interlaboratory standard deviation of measurements at an average concentration found of X, in ug/L.

C = True value for the concentration, in ug/L.

X = Average recovery found for measurements of samples containing a concentration of C, in ug/L.

METHOD 8080  
ORGANOCHLORINE PESTICIDES & PCBs





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TOTAL ORGANIC HALIDES (TOX)

## 1.0 SCOPE AND APPLICATION

1.1 Method 9020 determines Total Organic Halides (TOX) as chloride in drinking water and ground waters. The method uses carbon adsorption with a microcoulometric-titration detector.

1.2 Method 9020 detects all organic halides containing chlorine, bromine, and iodine that are adsorbed by granular activated carbon under the conditions of the method. Fluorine-containing species are not determined by this method.

1.3 Method 9020 is applicable to samples whose inorganic-halide concentration does not exceed the organic-halide concentration by more than 20,000 times.

1.4 Method 9020 does not measure TOX of compounds adsorbed to undissolved solids.

1.5 Method 9020 is restricted to use by, or under the supervision of, analysts experienced in the operation of a pyrolysis/microcoulometer and in the interpretation of the results.

1.6 This method is provided as a recommended procedure. It may be used as a reference for comparing the suitability of other methods thought to be appropriate for measurement of TOX (i.e., by comparison of sensitivity, accuracy, and precision of data). There are three instruments that can be used to carry out this method. They are the TOX-10 available from Cosa Instruments, and the DX-20 and DX-20A available from Xertex-Dohrmann Instruments.

## 2.0 SUMMARY OF METHOD

2.1 A sample of water that has been protected against the loss of volatiles by the elimination of headspace in the sampling container, and that is free of undissolved solids, is passed through a column containing 40 mg of activated carbon. The column is washed to remove any trapped inorganic halides and is then combusted to convert the adsorbed organohalides to HX, which is trapped and titrated electrolytically using a microcoulometric detector.

## 3.0 INTERFERENCES

3.1 Method interferences may be caused by contaminants, reagents, glassware, and other sample-processing hardware. All these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running method blanks.

3.1.1 Glassware must be scrupulously cleaned. Clean all glassware as soon as possible after use by treating with chromate cleaning solution. This should be followed by detergent washing in hot water. Rinse with tap water and distilled water and drain dry; glassware which is not volumetric should, in addition, be heated in a muffle furnace at 400°C for 15 to 30 min. (Volumetric ware should not be heated in a muffle furnace.) Glassware should be sealed and stored in a clean environment after drying and cooling to prevent any accumulation of dust or other contaminants.

3.1.2 The use of high-purity reagents and gases helps to minimize interference problems.

3.2 Purity of the activated carbon must be verified before use. Only carbon samples that register less than 1,000 ng Cl<sup>-</sup>/40 mg should be used. The stock of activated carbon should be stored in its granular form in a glass container with a Teflon seal. Exposure to the air must be minimized, especially during and after milling and sieving the activated carbon. No more than a 2-wk supply should be prepared in advance. Protect carbon at all times from all sources of halogenated organic vapors. Store prepared carbon and packed columns in glass containers with Teflon seals.

3.3 Particulate matter will prevent the passage of the sample through the adsorption column. Particulates must, therefore, be eliminated from the sample. This must be done as gently as possible, with the least possible sample manipulation, in order to minimize the loss of volatiles. It should also be noted that the measured TOX will be biased by the exclusion of TOX from compounds adsorbed onto the particulates. The following techniques may be used to remove particulates; however, data users must be informed of the techniques used and their possible effects on the data. These techniques are listed in order of preference:

3.3.1 Allow the particulates to settle in the sample container and decant the supernatant liquid into the adsorption system.

3.3.2 Centrifuge sample and decant the supernatant liquid into the adsorption system.

3.3.3 Measure Purgeable Organic Halides (POX) of sample (see instrument manufacturer's instructions for method) and Non-Purgeable Organic Halides (NPOX, that is, TOX of sample that has been purged of volatiles) separately, where the NPOX sample is centrifuged or filtered.

#### 4.0 APPARATUS AND MATERIALS

4.1 Adsorption system (a schematic diagram of the adsorption system is shown in Figure 1):

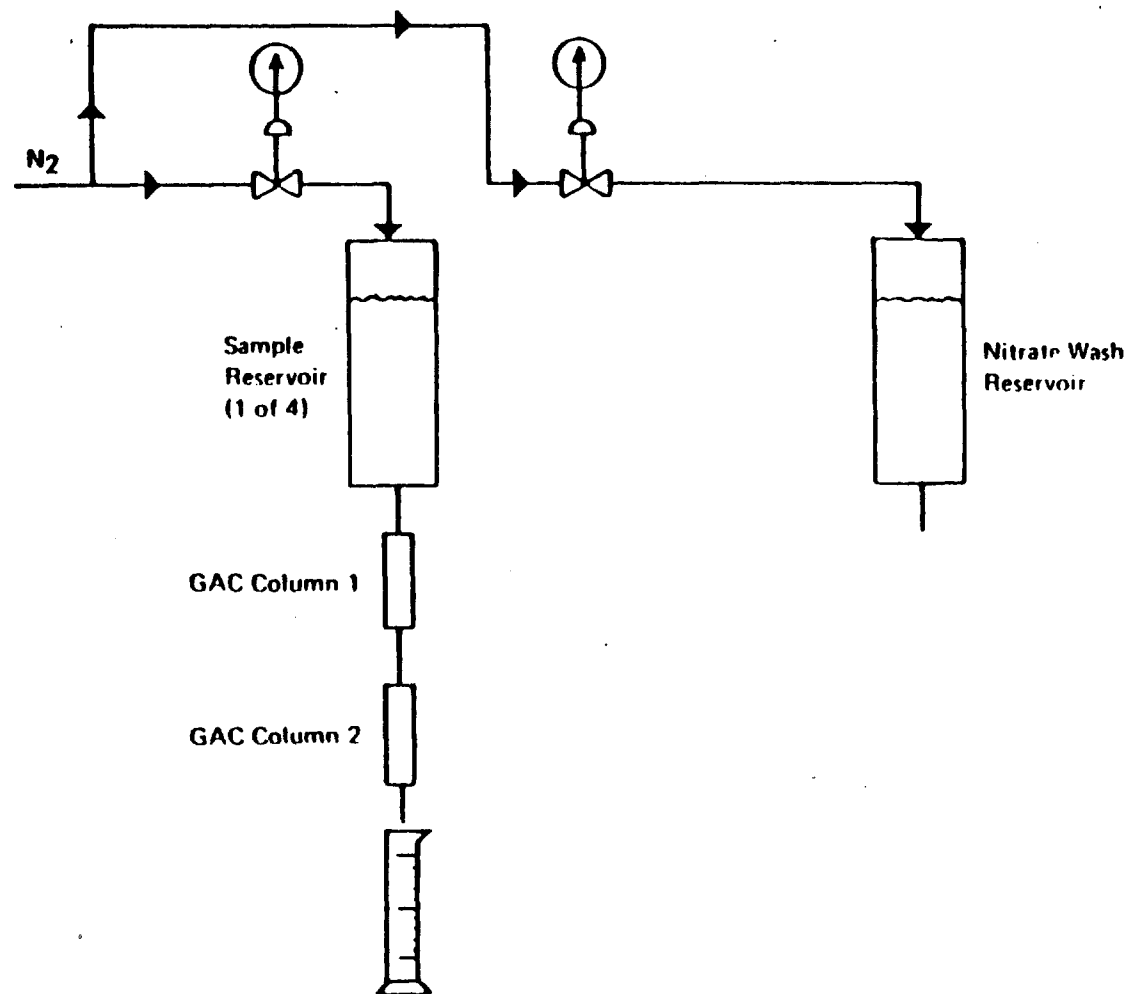


Figure 1. Schematic diagram of adsorption system.

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4.1.1 Adsorption module: Pressurized sample and nitrate-wash reservoirs. (There are three instruments known to EPA at this time that can be used to carry out this method. They are the TOX-10, available from Cosa Instruments, and the DX-20 and DX-20A, available from Xertex-Dohrmann Instruments.)

4.1.2 Adsorption columns: Pyrex, 5-cm-long x 6-mm-O.D. x 2-mm-I.D.

4.1.3 Granular activated carbon (GAC): Filtrasorb-400, Calgon-APC or equivalent, ground or milled, and screened to a 100/200 mesh range. Upon combustion of 40 mg of GAC, the apparent halide background should be 1,000 ng Cl<sup>-</sup> equivalent or less.

4.1.4 Cerafelt (available from Johns-Manville) or equivalent: Form this material into plugs to fit the adsorption module and to hold 40 mg of GAC in the adsorption columns.

CAUTION: Do not touch this material with your fingers. Oily residue will contaminate carbon.

4.1.5 Column holders.

4.1.6 Volumetric flasks: 100-mL, 50-mL.

#### 4.2 Analytical system:

4.2.1 Microcoulometric-titration system: Containing the following components (a flowchart of the analytical system is shown in Figure 2):

4.2.1.1 Boat sampler: Muffled at 800°C for at least 2-4 min and cleaned of any residue by vacuuming after each run.

4.2.1.2 Pyrolysis furnace.

4.2.1.3 Microcoulometer with integrator.

4.2.1.4 Titration cell.

4.2.2 Strip-chart recorder.

#### 5.0 REAGENTS

5.1 ASTM Type II water (ASTM D1193): Water should be monitored for impurities. Interferents should not be observable at the method detection limit of each parameter of interest.

5.2 Sodium sulfite (0.1 M): Dissolve 12.6 g ACS reagent grade Na<sub>2</sub>SO<sub>3</sub> in Type II water and dilute to 1 L.

5.3 Concentrated nitric acid (HNO<sub>3</sub>).

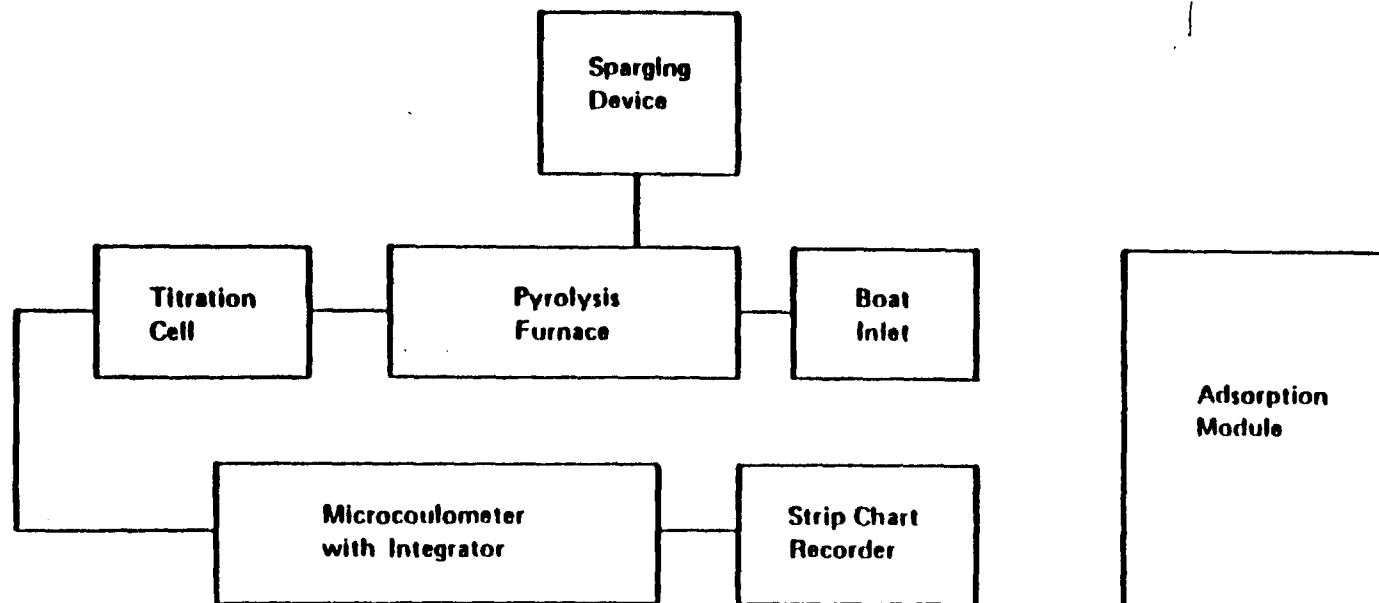


Figure 2. Flowchart of analytical system.

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5.4 Nitrate-wash solution (5,000 mg  $\text{NO}_3^-/\text{L}$ ): Prepare a nitrate-wash solution by transferring approximately 8.2 g of potassium nitrate ( $\text{KNO}_3$ ) into a 1-liter volumetric flask and diluting to volume with Type II water.

5.5 Carbon dioxide ( $\text{CO}_2$ ): Gas, 99.9% purity.

5.6 Oxygen ( $\text{O}_2$ ): 99.9% purity.

5.7 Nitrogen ( $\text{N}_2$ ): Prepurified.

5.8 Acetic acid in water (70%): Dilute 7 volumes of glacial acetic acid with 3 volumes of Type II water.

5.9 Trichlorophenol solution, stock (1  $\mu\text{L}$  = 10  $\mu\text{g Cl}^-$ ): Prepare a stock solution by accurately weighing accurately 1.856 g of trichlorophenol into a 100-mL volumetric flask. Dilute to volume with methanol.

5.10 Trichlorophenol solution, calibration (1  $\mu\text{L}$  = 500 ng  $\text{Cl}^-$ ): Dilute 5 mL of the trichlorophenol stock solution to 100 mL with methanol.

5.11 Trichlorophenol standard, instrument calibration: First, nitrate-wash a single column packed with 40 mg of activated carbon, as instructed for sample analysis, and then inject the column with 10  $\mu\text{L}$  of the calibration solution.

5.12 Trichlorophenol standard, adsorption efficiency (100  $\mu\text{g Cl}^-/\text{liter}$ ): Prepare an adsorption-efficiency standard by injecting 10  $\mu\text{L}$  of stock solution into 1 liter of Type II water.

5.13 Blank standard: The methanol used to prepare the calibration standard should be used as the blank standard.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 This method requires that all samples be run in duplicate.

6.2 All samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.3 All samples should be collected in bottles with Teflon septa (e.g., Pierce #12722 or equivalent) and be protected from light. If this is not possible, use amber glass 250-mL bottles fitted with Teflon-lined caps. Foil may be substituted for Teflon if the sample is not corrosive. Samples must be preserved by acidification to pH <2 with sulfuric acid, stored at 4°C, and protected against loss of volatiles by eliminating headspace in the container. The container must be washed and muffled at 400°C before use, to minimize contamination.

6.4 All glassware must be dried prior to use according to the method discussed in Paragraph 3.1.1.

## 7.0 PROCEDURE

### 7.1 Sample preparation:

7.1.1 Special care should be taken in handling the sample in order to minimize the loss of volatile organohalides. The adsorption procedure should be performed simultaneously on duplicates.

7.1.2 Reduce residual chlorine by adding sulfite (5 mg sodium sulfite crystals per liter of sample). Sulfite should be added at the time of sampling if the analysis is meant to determine the TOX concentration at the time of sampling. It should be recognized that TOX may increase on storage of the sample. Samples should be stored at 4°C without headspace.

### 7.2 Calibration:

7.2.1 Check the adsorption efficiency of each newly prepared batch of carbon by analyzing 100 mL of the adsorption efficiency standard, in duplicate, along with duplicates of the blank standard. The net recovery should be within 5% of the standard value.

7.2.2 Nitrate-wash blanks (method blanks): Establish the repeatability of the method background each day by first analyzing several nitrate-wash blanks. Monitor this background by spacing nitrate-wash blanks between each group of eight pyrolysis determinations. The nitrate-wash blank values are obtained on single columns packed with 40 mg of activated carbon. Wash with the nitrate solution, as instructed for sample analysis, and then pyrolyze the carbon.

7.2.3 Pyrolyze duplicate instrument-calibration standards and the blank standard each day before beginning sample analysis. The net response to the calibration standard should be within 3% of the calibration-standard value. Repeat analysis of the instrument-calibration standard after each group of eight pyrolysis determinations and before resuming sample analysis, and after cleaning or reconditioning the titration cell or pyrolysis system.

### 7.3 Adsorption procedure:

7.3.1 Connect two columns in series, each containing 40 mg of 100/200-mesh activated carbon.

7.3.2 Fill the sample reservoir and pass a metered amount of sample through the activated-carbon columns at a rate of approximately 3 mL/min.

NOTE: 100 mL of sample is the preferred volume for concentrations of TOX between 5 and 500 ug/L, 50 mL for 501 to 1000 ug/L, and 25 mL for 1001 to 2000 ug/L. If the anticipated TOX is greater than 2000 ug/L, dilute the sample so that 100 mL will contain between 1 and 50 ug TOX.



7.3.3 Wash the columns-in-series with 2 mL of the 5,000-mg/L nitrate solution at a rate of approximately 2 mL/min to displace inorganic chloride ions.

#### 7.4 Pyrolysis procedure:

7.4.1 The contents of each column are pyrolyzed separately. After being rinsed with the nitrate solution, the columns should be protected from the atmosphere and other sources of contamination until ready for further analysis.

7.4.2 Pyrolysis of the sample is accomplished in two stages. The volatile components are pyrolyzed in a CO<sub>2</sub>-rich atmosphere at a low temperature to ensure the conversion of brominated trihalomethanes to a titratable species. The less volatile components are then pyrolyzed at a high temperature in an O<sub>2</sub>-rich atmosphere.

7.4.3 Transfer the contents of each column to the quartz boat for individual analysis.

7.4.4 Adjust gas flow according to manufacturer's directions.

7.4.5 Position the sample for 2 min in the 200°C zone of the pyrolysis tube.

7.4.6 After 2 min, advance the boat into the 800°C zone (center) of the pyrolysis furnace. This second and final stage of pyrolysis may require from 6 to 10 min to complete.

7.5 Detection: The effluent gases are directly analyzed in the micro-coulometric-titration cell. Carefully follow manual instructions for optimizing cell performance.

7.6 Breakthrough: The unpredictable nature of the background bias makes it especially difficult to recognize the extent of breakthrough of organohalides from one column to another. All second-column measurements for a properly operating system should not exceed 10% of the two-column total measurement. If the 10% figure is exceeded, one of three events could have happened: (1) the first column was overloaded and a legitimate measure of breakthrough was obtained, in which case taking a smaller sample may be necessary; (2) channeling or some other failure occurred, in which case the sample may need to be rerun; or (3) a high random bias occurred, and the result should be rejected and the sample rerun. Because it may not be possible to determine which event occurred, a sample analysis should be repeated often enough to gain confidence in results. As a general rule, any analysis that is rejected should be repeated whenever a sample is available. In the event that repeated analyses show that the second column consistently exceeds the 10% figure and the total is too low for the first column to be saturated and the inorganic Cl is less than 20,000 times the organic chlorine

value, then the result should be reported, but the data user should be informed of the problem. If the second-column measurement is equal to or less than the nitrate-wash blank value, the second-column value should be disregarded.

7.7 Calculations: TOX as  $\text{Cl}^-$  is calculated using the following formula:

$$\frac{(C_1 - C_3) + (C_2 - C_3)}{V} = \text{ug/L Total Organic Halide}$$

where:

$C_1$  = ug  $\text{Cl}^-$  on the first column in series;

$C_2$  = ug  $\text{Cl}^-$  on the second column in series;

$C_3$  = predetermined, daily, average, method-blank value  
(nitrate-wash blank for a 40-mg carbon column); and

$V$  = the sample volume in liters.

## 8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 Employ a minimum of one blank per sample batch to determine if contamination or any memory effects are occurring.

8.3 Verify calibration with an independently prepared check standard every 15 samples.

8.4 Run one spike duplicate sample for every 10 samples. A duplicate sample is a sample brought through the whole sample-preparation and analytical process.

## 9.0 METHOD PERFORMANCE

9.1 Under conditions of duplicate analysis, the reliable limit of detection is 5 ug/L.

9.2 Analyses of distilled water, uncontaminated ground water, and ground water from RCRA waste management facilities spiked with volatile chlorinated organics generally gave recoveries between 75-100% over the concentration range 10-500 ug/L. Relative standard deviations were generally 20% at concentrations greater than 25 ug/L. These data are shown in Tables 1 and 2.

## 10.0 REFERENCES

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3. Tate, C., B. Chow, et al., EPA Method Study 32, Method 450.1, Total Organic Halides (TOX), EPA/600/S4-85/080, NTIS: PB 86 136538/AS.

TABLE 1. METHOD PERFORMANCE DATA<sup>a</sup>

Spiked Compound	Matrix <sup>b</sup>	TOX Concentration (ug/L)	Percent Recovery
Bromobenzene	D.W.	443	95
Bromodichloromethane	D.W.	160	98
Bromoform	D.W.	160	110
Bromoform	D.W.	238	100
Bromoform	G.W.	10	140
Bromoform	G.W.	31	93
Bromoform	G.W.	100	120
Chloroform	D.W.	98	89
Chloroform	D.W.	112	94
Chloroform	G.W.	10	79
Chloroform	G.W.	30	76
Chloroform	G.W.	100	81
Dibromodichloromethane	D.W.	155	86
Dibromodichloromethane	D.W.	374	73
Tetrachloroethylene	G.W.	10	79
Tetrachloroethylene	G.W.	30	75
Tetrachloroethylene	G.W.	101	78
trans-Dichloroethylene	G.W.	10	84
trans-Dichloroethylene	G.W.	30	63
trans-Dichloroethylene	G.W.	98	60

<sup>a</sup>Results from Reference 2.

<sup>b</sup>G.W. = Ground Water.

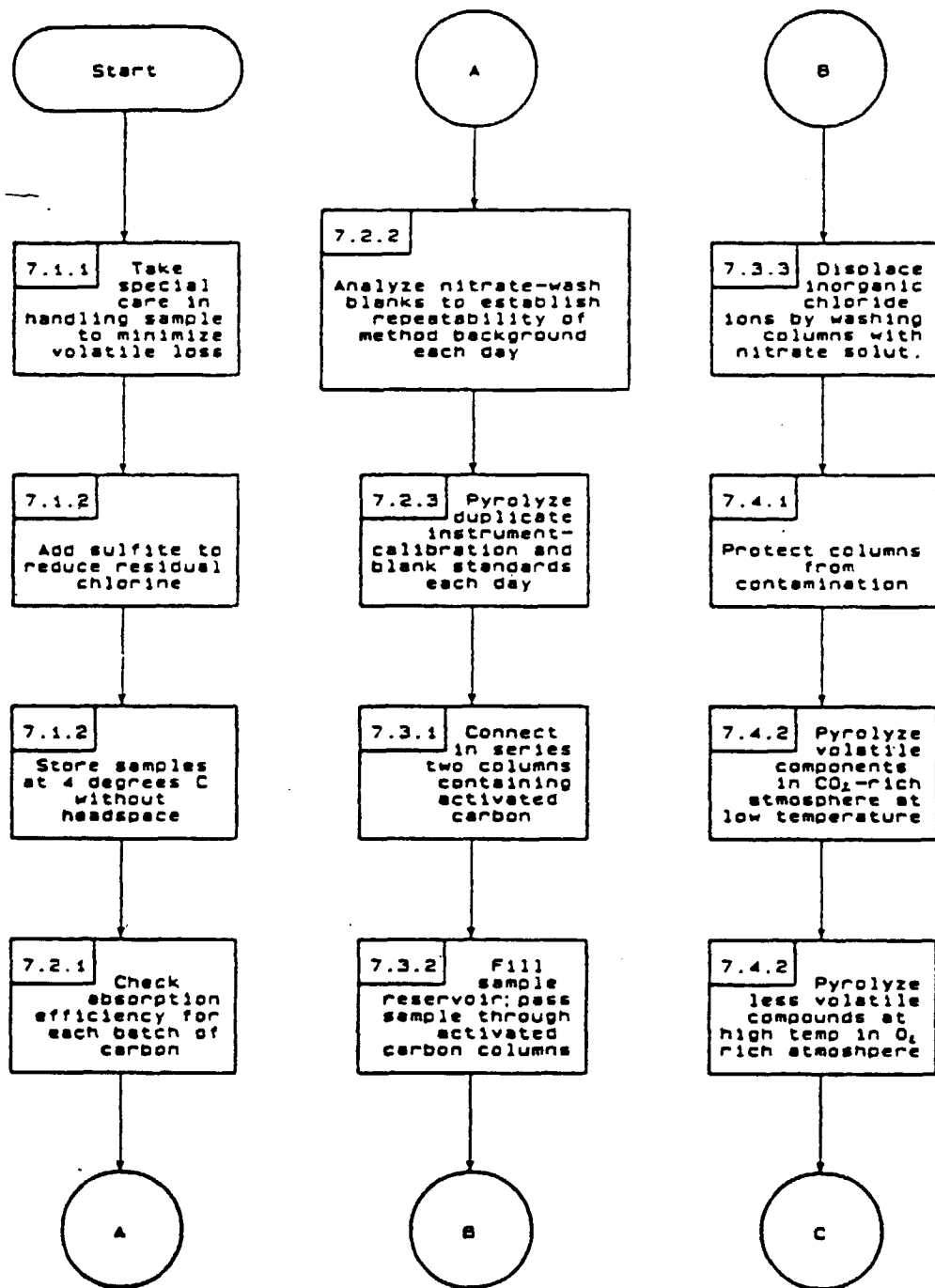
D.W. = Distilled Water.

TABLE 2. METHOD PERFORMANCE DATA<sup>a</sup>

Sample Matrix	Unspiked TOX (ug/L)	Spike Level	Percent Recovery
Ground Water	68, 69	100	98, 99
Ground Water	5, 12	100	110, 110
Ground Water	5, 10	100	95, 105
Ground Water	54, 37	100	111, 106
Ground Water	17, 15	100	98, 89
Ground Water	11, 21	100	97, 89

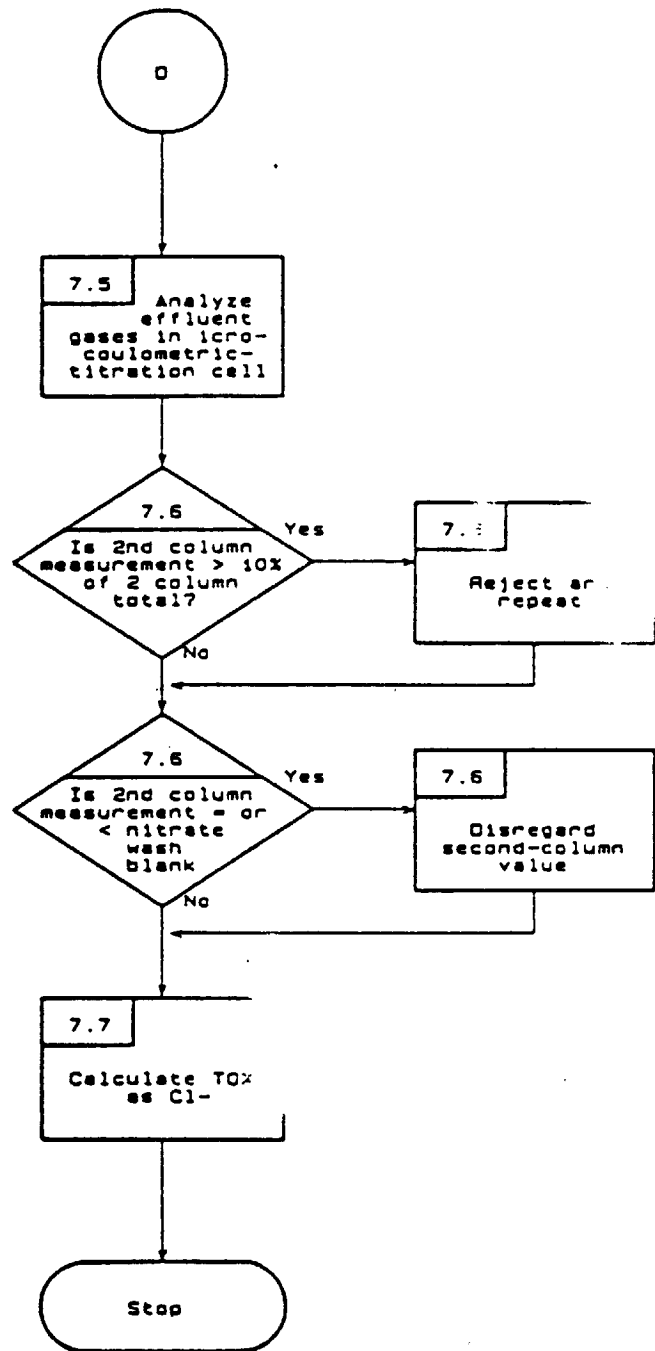
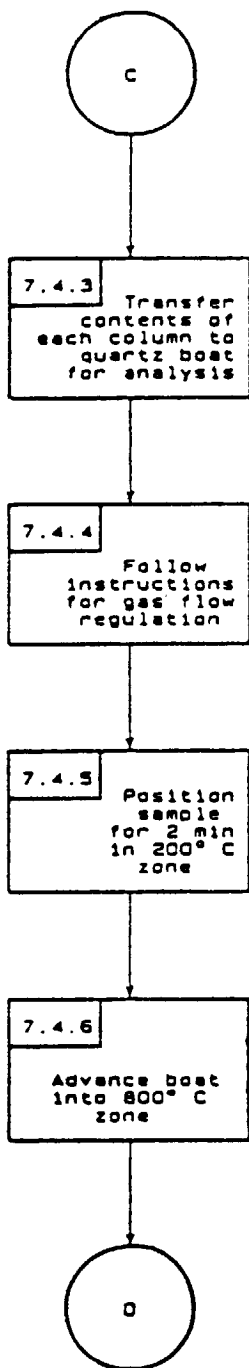
<sup>a</sup>Results from Reference 3.

METHOD 9020  
TOTAL ORGANIC HALIDES (TOX)



00007

METHOD 9020  
TOTAL ORGANIC HALIDES (TOX)  
(Continued)



## METHOD 8090

### NITROAROMATICS AND CYCLIC KETONES

#### 1.0 SCOPE AND APPLICATION

1.1 Method 8090 is used to determine the concentration of various nitroaromatic and cyclic ketone compounds. Table 1 indicates compounds that may be determined by this method and lists the method detection limit for each compound in reagent water. Table 2 lists the practical quantitation limit (PQL) for other matrices.

#### 2.0 SUMMARY OF METHOD

2.1 Method 8090 provides gas chromatographic conditions for the detection of ppb levels of nitroaromatic and cyclic ketone compounds. Prior to use of this method, appropriate sample extraction techniques must be used. Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. A 2- to 5- $\mu$ L aliquot of the extract is injected into a gas chromatograph (GC) using the solvent flush technique, and compounds in the GC effluent are detected by an electron capture detector (ECD) or a flame ionization detector (FID). The dinitrotoluenes are determined using ECD, whereas the other compounds amenable to this method are determined using FID.

2.2 If interferences prevent proper detection of the analytes, the method may also be performed on extracts that have undergone cleanup.

#### 3.0 INTERFERENCES

3.1 Refer to Method 3500, 3600, and 8000.

3.2 Solvents, reagents, glassware, and other sample-processing hardware may yield discrete artifacts and/or elevated baselines causing misinterpretation of gas chromatograms. All of these materials must be demonstrated to be free from interferences, under the conditions of the analysis, by analyzing method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be required.

3.3 Interferences coextracted from samples will vary considerably from source to source, depending upon the waste being sampled. Although general cleanup techniques are recommended as part of this method, unique samples may require additional cleanup.



TABLE 1. GAS CHROMATOGRAPHY OF NITROAROMATICS AND ISOPHORONE

Compound	Retention time (min)		Method detection limit (ug/L)	
	Col. 1 <sup>a</sup>	Col. 2 <sup>b</sup>	ECD	FID
Isophorone	4.49	5.72	15.7	5.7
Nitrobenzene	3.31	4.31	13.7	3.6
2,4-Dinitrotoluene	5.35	6.54	0.02	-
2,6-Dinitrotoluene	3.52	4.75	0.01	-
Dinitrobenzene				
Naphthoquinone				

<sup>a</sup>Column 1: Gas-Chrom Q (80/100 mesh) coated with 1.95% QF-1/1.5% OV-17 packed in a 1.2-m x 2-mm or 4-mm I.D. glass column. A 2-mm I.D. column and nitrogen gas at 44 mL/min flow rate were used when determining isophorone and nitrobenzene by GC/FID. The column temperature was held isothermal at 85°C. A 4-mm I.D. column and 10% methane/90% argon carrier gas at 44 mL/min flow rate were used when determining the dinitrotoluenes by GC/ECD. The column temperature was held isothermal at 145°C.

<sup>b</sup>Column 2: Gas-Chrom Q (80/100 mesh) coated with 3% OV-101 packed in a 3.0-m x 2-mm or 4-mm I.D. glass column. A 2-mm I.D. column and nitrogen carrier gas at 44 mL/min flow rate were used when determining isophorone and nitrobenzene by GC/FID. The column temperature was held isothermal at 100°C. A 4-mm I.D. column and 10% methane/90% argon carrier gas at 44 mL/min flow rate were used to determine the dinitrotoluenes by GC/ECD. The column temperature was held isothermal at 150°C.

TABLE 2. DETERMINATION OF PRACTICAL QUANTITATION LIMITS (PQL) FOR VARIOUS MATRICES<sup>a</sup>

Matrix	Factor <sup>b</sup>
Ground water	10
Low-level soil by sonication with GPC cleanup	670
High-level soil and sludges by sonication	10,000
Non-water miscible waste	100,000

<sup>a</sup>Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

<sup>b</sup>Multiply the Method Detection Limits in Table 1 by the Factor to determine the PQL for each analyte in the matrix to be analyzed.

## 4.0 APPARATUS AND MATERIALS

### 4.1 Gas chromatograph:

4.1.1 Gas chromatograph: Analytical system complete with gas chromatograph suitable for on-column injections and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak areas and/or peak heights is recommended.

### — 4.1.2 Columns:

4.1.2.1 Column 1: 1.2-m x 2- or 4-mm I.D. glass column packed with 1.95% QF-1/1.5% OV-17 on Gas-Chrom Q (80/100 mesh) or equivalent.

4.1.2.2 Column 2: 3.0-m x 2- or 4-mm I.D. glass column packed with 3% OV-101 on Gas-Chrom Q (80/100 mesh) or equivalent.

4.1.3 Detectors: Flame ionization (FID) or electron capture (ECD).

### 4.2 Kuderna-Danish (K-D) apparatus:

4.2.1 Concentrator tube: 10-mL, graduated (Kontes K-570050-1025 or equivalent). Ground-glass stopper is used to prevent evaporation of extracts

4.2.2 Evaporation flask: 500-mL (Kontes K-570001-500 or equivalent). Attach to concentrator tube with springs.

4.2.3 Snyder column: Three-ball macro (Kontes K-503000-0121 or equivalent).

4.2.4 Snyder column: Two-ball micro (Kontes K-569001-0219 or equivalent).

4.3 Boiling chips: Solvent extracted, approximately 10/40 mesh (silicon carbide or equivalent).

4.4 Water bath: Heated, with concentric ring cover, capable of temperature control ( $\pm 5^{\circ}\text{C}$ ). The bath should be used in a hood.

4.5 Volumetric flasks: 10-, 50-, and 100-mL, ground-glass stopper.

4.6 Microsyringe: 10-uL.

4.7 Syringe: 5-mL.

4.8 Vials: Glass, 2-, 10-, and 20-mL capacity with Teflon-lined screw cap.

## 5.0 REAGENTS

5.1 Solvents: hexane, acetone (pesticide quality or equivalent.)

5.2 Stock standard solutions:

5.2.1 Prepare stock standard solutions at a concentration of 1.00 ug/uL by dissolving 0.0100 g of assayed reference material in hexane and diluting to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

5.2.2 Transfer the stock standard solutions into Teflon-sealed screw-cap bottles. Store at 4°C and protect from light. Stock standards should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.2.3 Stock standard solutions must be replaced after one year, or sooner if comparison with check standards indicates a problem.

5.3 Calibration standards: Calibration standards at a minimum of five concentration levels are prepared through dilution of the stock standards with hexane. One of the concentration levels should be at a concentration near, but above, the method detection limit. The remaining concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC. Calibration solutions must be replaced after six months, or sooner if comparison with a check standard indicates a problem.

5.4 Internal standards (if internal standard calibration is used): To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

5.4.1 Prepare calibration standards at a minimum of five concentration levels for a parameter of interest as described in Paragraph 5.3.

5.4.2 To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with hexane.

5.4.3 Analyze each calibration standard according to Section 7.0.

5.5 Surrogate standards: The analyst should monitor the performance of the extraction, cleanup (when used), and analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each

sample, standard, and reagent water blank with one or two surrogates (e.g., 2-fluorobiphenyl) recommended to encompass the range of the temperature program used in this method. Method 3500, Section 5.3.1.1, details instructions on the preparation of base/neutral surrogates. Deuterated analogs of analytes should not be used as surrogates for gas chromatographic analysis due to coelution problems.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Section 4.1. Extracts must be stored under refrigeration and analyzed within 40 days of extraction.

## 7.0 PROCEDURE

### 7.1 Extraction:

7.1.1 Refer to Chapter Two for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a pH between 5 to 9 with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using either Method 3540 or 3550.

7.1.2 Prior to gas chromatographic analysis, the extraction solvent must be exchanged to hexane. The exchange is performed during the K-D procedures listed in all of the extraction methods. The exchange may be performed in one of two ways, depending on the data requirements. If the detection limits cited in Table 1 must be achieved, the exchange should be performed as described starting in Section 7.1.4. If these detection limits are not necessary, solvent exchange is performed as outlined in Section 7.1.3.

7.1.3 Solvent exchange when detection limits in Table 1 are not required:

7.1.3.1 Following K-D of the methylene chloride extract to 1 mL using the macro-Snyder column, allow the apparatus to cool and drain for at least 10 min.

7.1.3.2 Momentarily remove the Snyder column, add 50 mL of hexane, a new boiling chip, and reattach the macro-Snyder column. Concentrate the extract using 1 mL of hexane to prewet the Snyder column. Place the K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 1 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min. The extract will be handled differently

at this point, depending on whether or not cleanup is needed. If cleanup is not required, proceed to Paragraph 7.1.3.3. If cleanup is needed, proceed to Paragraph 7.1.3.4.

7.1.3.3 If cleanup of the extract is not required, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1-2 mL of hexane. A 5-mL syringe is recommended for this operation. Adjust the extract volume to 10.0 mL. Stopper the concentrator tube and store refrigerated at 4°C if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. Proceed with gas chromatographic analysis.

7.1.3.4 If cleanup of the extract is required, remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with a minimum amount of hexane. A 5-mL syringe is recommended for this operation. Add a clean boiling chip to the concentrator tube and attach a two-ball micro-Snyder column. Prewet the column by adding about 0.5 mL of hexane to the top. Place the micro-K-D apparatus on the water bath (80°C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

7.1.3.5 Remove the micro-Snyder column and rinse the flask and its lower joint into the concentrator tube with 0.2 mL of hexane. Adjust the extract volume to 2.0 mL and proceed with Method 3620.

7.1.4 Solvent exchange when detection limits listed in Table 1 must be achieved:

7.1.4.1 Following K-D of the methylene chloride extract to 1 mL using the macro-Snyder column, allow the apparatus to cool and drain for at least 10 min.

7.1.4.2 Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1-2 mL of methylene chloride. A 5-mL syringe is recommended for this operation. Add 1-2 mL of hexane, a clean boiling chip, and attach a two-ball micro-Snyder column. Prewet the column by adding 0.5 mL of hexane to the top. Place the micro-K-D apparatus on the water bath (60-65°C) so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 min. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 min.

7.1.4.3 Remove the micro-Snyder column and rinse the flask and its lower joint into the concentrator tube with a minimum amount of hexane. The volume of the extract should be adjusted to 1.0 mL if the extract will be analyzed without cleanup. If the extract will require cleanup, adjust the volume to 2.0 mL with hexane. Stopper the concentrator tube and store refrigerated at 4°C if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a Teflon-sealed screw-cap vial. Proceed with either gas chromatographic analysis or with cleanup, as necessary.

7.2 Gas chromatography conditions (Recommended): The determination of dinitrotoluenes should be performed using GC/ECD. All other compounds amenable to this method are to be analyzed by GC/FID.

7.2.1 Column 1: Set 10% methane/90% argon carrier gas flow at 44 mL/min flow rate. For a 2-mm I.D. column, set the temperature at 85°C isothermal. For a 4-mm I.D. column, set the temperature at 145°C isothermal.

7.2.2 Column 2: Set 10% methane/90% argon carrier gas flow at 44 mL/min flow rate. For a 2-mm I.D. column, set the temperature at 100°C isothermal. For a 4-mm I.D. column, set the temperature at 150°C isothermal.

7.3 Calibration: Refer to Method 8000 for proper calibration techniques. Use Table 1 and especially Table 2 for guidance on selecting the lowest point on the calibration curve.

7.3.1 The procedure for internal or external standard calibration may be used. Refer to Method 8000 for a description of each of these procedures.

7.3.4 If cleanup is performed on the samples, the analyst should process a series of standards through the cleanup procedure and then analyze the samples by GC. This will confirm elution patterns and the absence of interferents from the reagents.

#### 7.4 Gas chromatographic analysis:

7.4.1 Refer to Method 8000. If the internal standard calibration technique is used, add 10 µL of internal standard to the sample prior to injection.

7.4.2 Follow Section 7.6 in Method 8000 for instructions on the analysis sequence, appropriate dilutions, establishing daily retention time windows, and identification criteria. Include a mid-level standard after each group of 10 samples in the analysis sequence when using FID and after each group of 5 samples in the analysis sequence when using ECD.

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7.4.3 An example of a GC/FID chromatogram for nitrobenzene and isophorone is shown in Figure 1. Figure 2 is an example of a GC/ECD chromatogram of the dinitrotoluenes.

7.4.4 Record the sample volume injected and the resulting peak sizes (in area units or peak heights).

7.4.5 Using either the internal or external calibration procedure (Method 8000), determine the identity and quantity of each analyte peak in the sample chromatogram. See Section 7.8 of Method 8000 for calculation equations.

7.4.6 If peak detection and identification are prevented due to interferences, the hexane extract may undergo cleanup using Method 3620.

#### 7.5 Cleanup:

7.5.1 Proceed with Method 3620, using the 2-mL hexane extracts obtained from either Paragraph 7.1.3.5 or 7.1.4.3.

7.5.2 Following cleanup, the extracts should be analyzed by GC, as described in the previous paragraphs and in Method 8000.

### 8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures. Quality control to validate sample extraction is covered in Method 3500 and in the extraction method utilized. If extract cleanup was performed, follow the QC in Method 3600 and in the specific cleanup method.

8.2 Procedures to check the GC system operation are found in Method 8000, Section 8.6.

8.2.1 The quality control check sample concentrate (Method 8000, Section 8.6) should contain each parameter of interest in acetone at a concentration of 20 ug/mL for each dinitrotoluene and 100 ug/mL for isophorone and nitrobenzene.

8.2.2 Table 3 indicates the calibration and QC acceptance criteria for this method. Table 4 gives method accuracy and precision as functions of concentration for the analytes of interest. The contents of both Tables should be used to evaluate a laboratory's ability to perform and generate acceptable data by this method.

8.3 Calculate surrogate standard recovery on all samples, blanks, and spikes. Determine if the recovery is within limits (limits established by performing QC procedures outlined in Method 8000, Section 8.10).

COLUMN: 1.5% OV-17 +1.95% QF-1  
ON GAS CHROM Q  
TEMPERATURE: 85°C.  
DETECTOR: FLAME IONIZATION

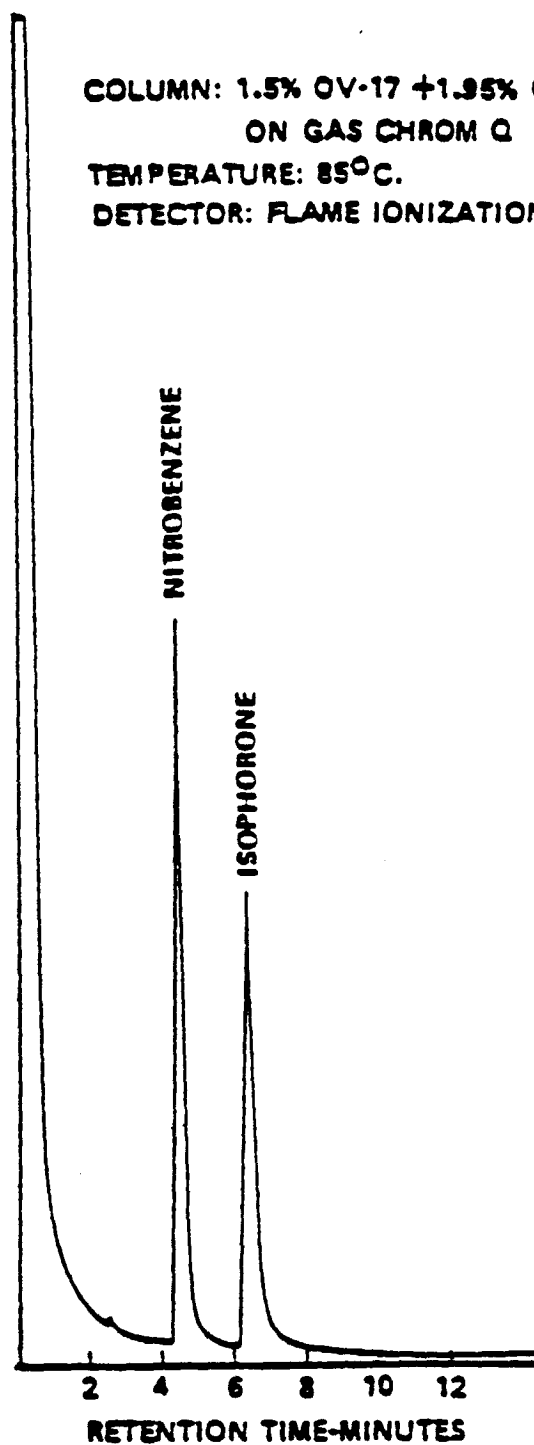


Figure 1. Gas chromatogram of nitrobenzene and isophorone.



COLUMN: 1.5% OV-17 +1.95% QF-1  
ON GAS CHROM Q  
TEMPERATURE: 145°C.  
DETECTOR: ELECTRON CAPTURE

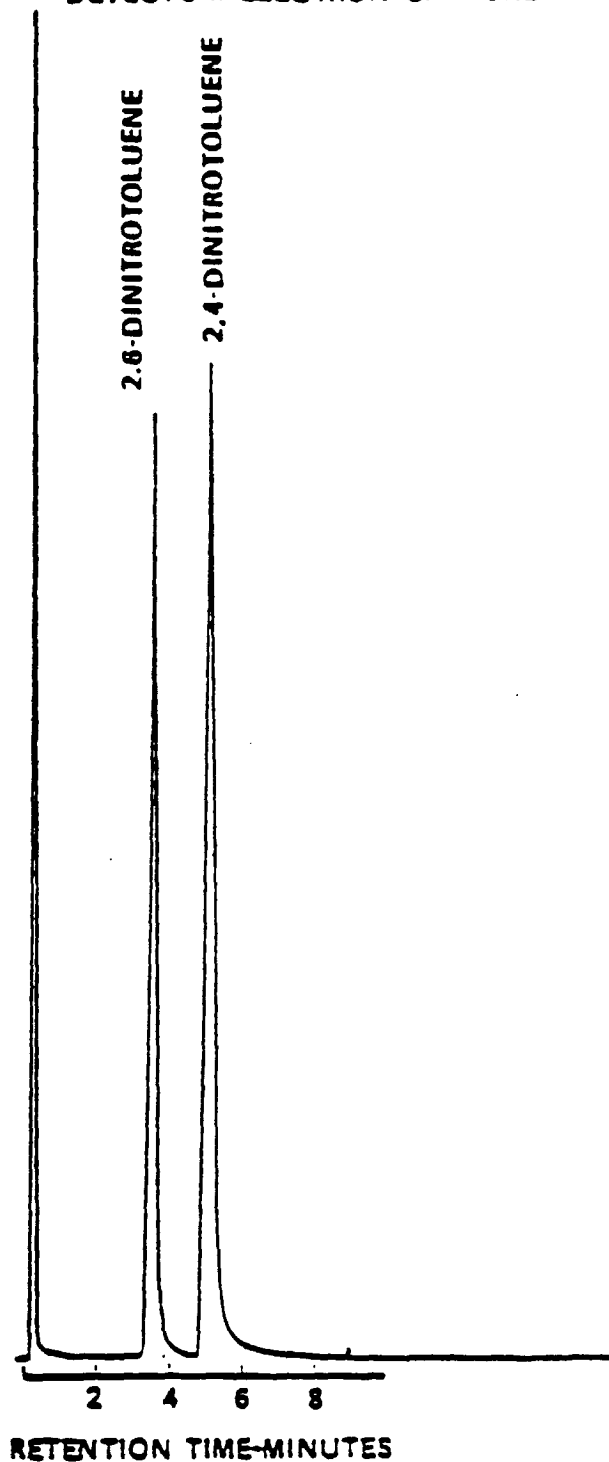


Figure 2. Gas chromatogram of dinitrotoluenes.

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8.3.1 If recovery is not within limits, the following is required.

- Check to be sure there are no errors in calculations, surrogate solutions and internal standards. Also, check instrument performance.
- Recalculate the data and/or reanalyze the extract if any of the above checks reveal a problem.
- Reextract and reanalyze the sample if none of the above are a problem or flag the data as "estimated concentration."

## 9.0 METHOD PERFORMANCE

9.1 The method was tested by 18 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 1.0 to 515 ug/L. Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships for a flame ionization detector are presented in Table 4.

9.2 The accuracy and precision obtained will be determined by the sample matrix, sample-preparation technique, and calibration procedures used.

## 10.0 REFERENCES

1. "Development and Application of Test Procedures for Specific Organic Toxic Substances in Wastewaters. Category 4 - Nitroaromatics and Isophorone," Report for EPA Contract 68-03-2624 (in preparation).
2. "Determination of Nitroaromatics and Isophorone in Industrial and Municipal Wastewaters," EPA-600/4-82-024, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268, June 1982.
3. Burke, J.A. "Gas Chromatography for Pesticide Residue Analysis; Some Practical Aspects," Journal of the Association of Official Analytical Chemists, 48, 1037, 1965.
4. "EPA Method Validation Study 19, Method 609 (Nitroaromatics and Isophorone)," Report for EPA Contract 68-03-2624 (in preparation).
5. U.S. EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule," October 26, 1984.
6. Provost, L.P. and R.S. Elder, "Interpretation of Percent Recovery Data," American Laboratory, 15, pp. 58-63, 1983.

TABLE 3. QC ACCEPTANCE CRITERIA<sup>a</sup>

Parameter	Test conc. (ug/L)	Limit for s (ug/L)	Range for $\bar{x}$ (ug/L)	Range P, P <sub>s</sub> (%)
2,4-Dinitrotoluene	20	5.1	3.6-22.8	6-125
2,6-Dinitrotoluene	20	4.8	3.8-23.0	8-126
Isophorone	100	32.3	8.0-100.0	D-117
Nitrobenzene	100	33.3	25.7-100.0	6-118

s = Standard deviation of four recovery measurements, in ug/L.

$\bar{x}$  = Average recovery for four recovery measurements, in ug/L.

P, P<sub>s</sub> = Percent recovery measured.

D = Detected; result must be greater than zero.

<sup>a</sup>Criteria from 40 CFR Part 136 for Method 609. These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 4.

TABLE 4. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION

Parameter	Accuracy, as recovery, $x'$ (ug/L)	Single analyst precision, $s_r'$ (ug/L)	Overall precision, $S'$ (ug/L)
2,4-Dinitrotoluene	$0.65C+0.22$	$0.20\bar{x}+0.08$	$0.37\bar{x}-0.07$
2,4-Dinitrotoluene	$0.66C+0.20$	$0.19\bar{x}+0.06$	$0.36\bar{x}-0.00$
Isophorene	$0.49C+2.93$	$0.28\bar{x}+2.77$	$0.46\bar{x}+0.31$
Nitrobenzene	$0.60C+2.00$	$0.25\bar{x}+2.53$	$0.37\bar{x}-0.78$

$x'$  = Expected recovery for one or more measurements of a sample containing a concentration of  $C$ , in ug/L.

$s_r'$  = Expected single analyst standard deviation of measurements at an average concentration of  $\bar{x}$ , in ug/L.

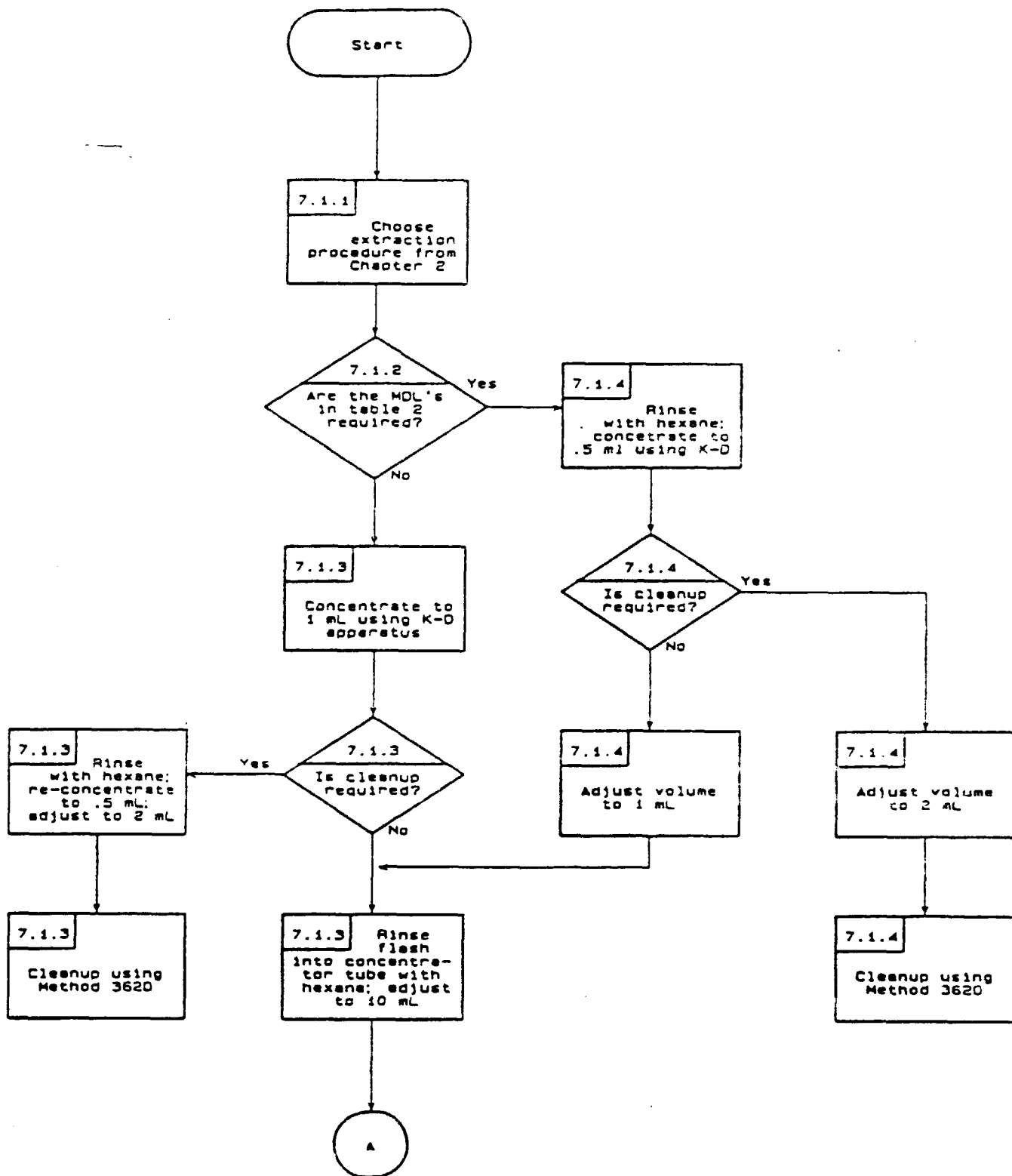
$S'$  = Expected interlaboratory standard deviation of measurements at an average concentration found of  $\bar{x}$ , in ug/L.

$C$  = True value for the concentration, in ug/L.

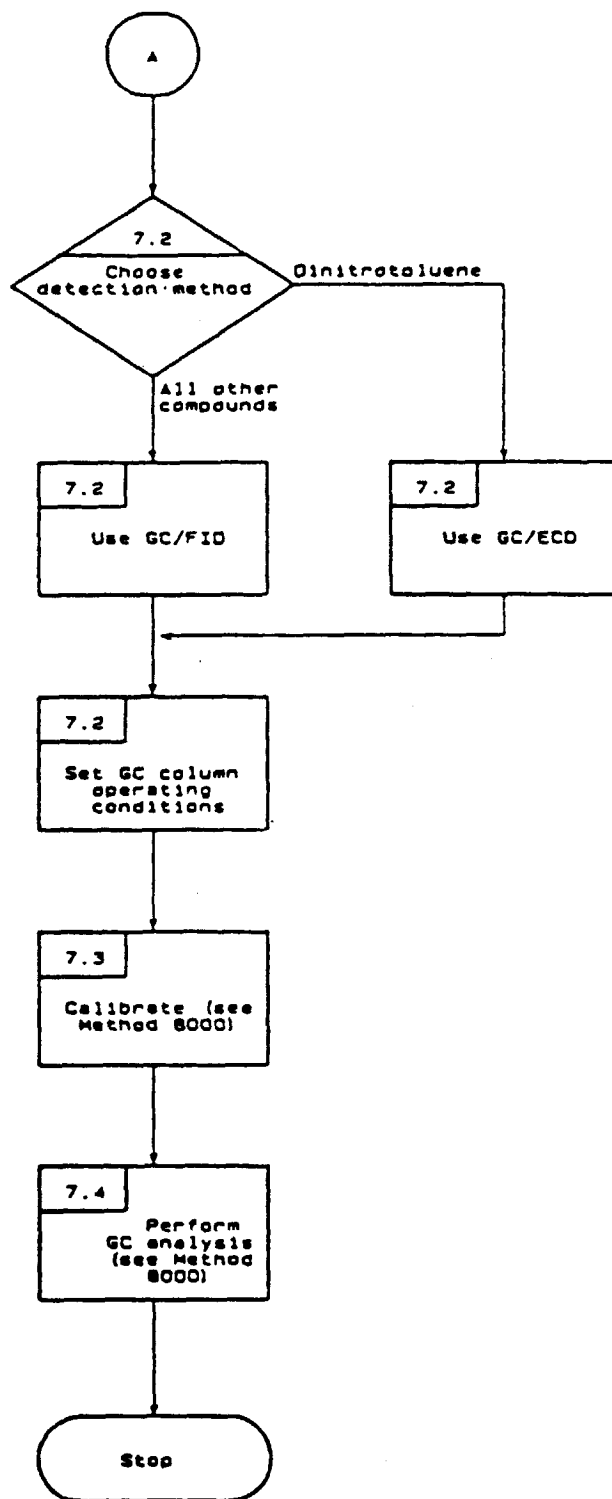
$\bar{x}$  = Average recovery found for measurements of samples containing a concentration of  $C$ , in ug/L.

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METHOD 8090  
NITROAROMATICS AND CYCLIC KETONES



METHOD 8090  
NITROAROMATICS AND CYCLIC KETONES  
(Continued)



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## METHOD 8020

### AROMATIC VOLATILE ORGANICS

#### 1.0 SCOPE AND APPLICATION

1.1 Method 8020 is used to determine the concentration of various aromatic volatile organic compounds. Table 1 indicates compounds which may be determined by this method and lists the method detection limit for each compound in reagent water. Table 2 lists the practical quantitation limit (PQL) for other matrices.

#### 2.0 SUMMARY OF METHOD

2.1 Method 8020 provides chromatographic conditions for the detection of aromatic volatile compounds. Samples can be analyzed using direct injection or purge-and-trap (Method 5030). Ground water samples must be determined using Method 5030. A temperature program is used in the gas chromatograph to separate the organic compounds. Detection is achieved by a photo-ionization detector (PID).

2.2 If interferences are encountered, the method provides an optional gas chromatographic column that may be helpful in resolving the analytes from the interferences and for analyte confirmation.

#### 3.0 INTERFERENCES

3.1 Refer to Method 5030 and 8000.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly chlorofluorocarbons and methylene chloride) through the sample container septum during shipment and storage. A field sample blank prepared from reagent water and carried through sampling and subsequent storage and handling can serve as a check on such contamination.

#### 4.0 APPARATUS AND MATERIALS

##### 4.1 Gas chromatograph:

4.1.1 Gas Chromatograph: Analytical system complete with gas chromatograph suitable for on-column injections or purge-and-trap sample introduction and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak heights and/or peak areas is recommended.



TABLE 1. CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS FOR AROMATIC VOLATILE ORGANICS

Compound	Retention time (min)		Method detection limit <sup>a</sup> (ug/L)
	Col. 1	Col. 2	
Benzene	3.33	2.75	0.2
Chlorobenzene	9.17	8.02	0.2
1,4-Dichlorobenzene	16.8	16.2	0.3
1,3-Dichlorobenzene	18.2	15.0	0.4
1,2-Dichlorobenzene	25.9	19.4	0.4
Ethyl Benzene	8.25	6.25	0.2
Toluene	5.75	4.25	0.2
Xylenes			

<sup>a</sup> Using purge-and-trap method (Method 5030).

TABLE 2. DETERMINATION OF PRACTICAL QUANTITATION LIMITS (PQL) FOR VARIOUS MATRICES<sup>a</sup>

Matrix	Factor <sup>b</sup>
Ground water	10
Low-level soil	10
Water miscible liquid waste	500
High-level soil and sludge	1250
Non-water miscible waste	1250

<sup>a</sup>Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

<sup>b</sup>PQL = [Method detection limit (Table 1)] X [Factor (Table 2)]. For non-aqueous samples, the factor is on a wet-weight basis.

#### 4.1.2 Columns:

4.1.2.1 Column 1: 6-ft x 0.082-in I.D. #304 stainless steel or glass column packed with 5% SP-1200 and 1.75% Bentone-34 on 100/120 mesh Supelcort or equivalent.

4.1.2.2 Column 2: 8-ft x 0.1-in I.D. stainless steel or glass column packed with 5% 1,2,3-Tris(2-cyanoethoxy)propane on 60/80 mesh Chromosorb W-AW or equivalent.

4.1.3 Detector: Photoionization (PID) (h-Nu Systems, Inc. Model PI-51-02 or equivalent).

4.2 Sample introduction apparatus: Refer to Method 5030 for the appropriate equipment for sample introduction purposes.

4.3 Syringes: A 5-mL Luerlok glass hypodermic and a 5-mL, gas-tight with shutoff valve.

4.4 Volumetric flask: 10-, 50-, 100-, 500-, and 1,000-mL with a ground-glass stopper.

4.5 Microsyringe: 10- and 25- $\mu$ L with a 0.006-in I.D. needle (Hamilton 702N or equivalent) and a 100- $\mu$ L.

#### 5.0 REAGENTS

5.1 Reagent water: Reagent water is defined as a water in which an interferent is not observed at the method detection limit (MDL) of the parameters of interest.

5.2 Stock standards: Stock solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standards in methanol using assayed liquids. Because of the toxicity of benzene and 1,4-dichlorobenzene, primary dilutions of these materials should be prepared in a hood.

5.2.1 Place about 9.8 mL of methanol in a 10-mL tared ground-glass-stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 min or until all alcohol-wetted surfaces have dried. Weigh the flask to the nearest 0.1 mg.

5.2.2 Using a 100- $\mu$ L syringe, immediately add two or more drops of assayed reference material to the flask; then reweigh. The liquid must fall directly into the alcohol without contacting the neck of the flask.

5.2.3 Reweigh, dilute to volume, stopper, and then mix by inverting the flask several times. Calculate the concentration in micrograms per microliter ( $\mu$ g/ $\mu$ L) from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight may be used without correction

to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.2.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store, with minimal headspace, at 4°C and protect from light.

5.2.5 All standards must be replaced after 6 months, or sooner if comparison with check standards indicates a problem.

5.3 Secondary dilution standards: Using stock standard solutions, prepare in methanol secondary dilution standards, as needed, that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Paragraph 5.4 will bracket the working range of the analytical system. Secondary dilution standards should be stored with minimal headspace for volatiles and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.4 Calibration standards: Calibration standards at a minimum of five concentration levels are prepared in reagent water from the secondary dilution of the stock standards. One of the concentration levels should be at a concentration near, but above, the method detection limit. The remaining concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC. Each standard should contain each analyte for detection by this method (e.g., some or all of the compounds listed in Table 1 may be included). In order to prepare accurate aqueous standard solutions, the following precautions must be observed.

5.4.1 Do not inject more than 20 uL of alcoholic standards into 100 mL of reagent water.

5.4.2 Use a 25-uL Hamilton 702N microsyringe or equivalent (variations in needle geometry will adversely affect the ability to deliver reproducible volumes of methanolic standards into water).

5.4.3 Rapidly inject the alcoholic standard into the filled volumetric flask. Remove the needle as fast as possible after injection.

5.4.4 Mix aqueous standards by inverting the flask three times only.

5.4.5 Fill the sample syringe from the standard solution contained in the expanded area of the flask (do not use any solution contained in the neck of the flask).

5.4.6 Never use pipets to dilute or transfer samples or aqueous standards.

5.4.7 Aqueous standards are not stable and should be discarded after 1 hr, unless properly sealed and stored. The aqueous standards can be stored up to 24 hr, if held in sealed vials with zero headspace.

5.5 Internal standards (if internal standard calibration is used): To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples. The compound, alpha,alpha,alpha-trifluorotoluene recommended for use as a surrogate spiking compound (Paragraph 5.6) has been used successfully as an internal standards.

5.5.1 Prepare calibration standards at a minimum of five concentration levels for each parameter of interest as described in Section 5.4.

5.5.2 Prepare a spiking solution containing each of the internal standards using the procedures described in Sections 5.2 and 5.3. It is recommended that the secondary dilution standard be prepared at a concentration of 15 ug/mL of each internal standard compound. The addition of 10 uL of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 ug/L.

5.5.3 Analyze each calibration standard according to Section 7.0, adding 10 uL of internal standard spiking solution directly to the syringe.

5.6 Surrogate standards: The analyst should monitor both the performance of the analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and reagent water blank with surrogate compounds (e.g, alpha,alpha,alpha-trifluorotoluene) recommended to encompass the range of the temperature program used in this method. From stock standard solutions prepared as in Section 5.2, add a volume to give 750 ug of each surrogate to 45 mL of reagent water contained in a 50-mL volumetric flask, mix, and dilute to volume for a concentration of 15 ng/uL. Add 10 uL of this surrogate spiking solution directly into the 5-mL syringe with every sample and reference standard analyzed. If the internal standard calibration procedure is used, the surrogate compounds may be added directly to the internal standard spiking solution (Paragraph 5.5.2).

5.7 Methanol: pesticide quality or equivalent. Store away from other solvents.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Section 4.1.

## 7.0 PROCEDURE

7.1 Volatile compounds are introduced into the gas chromatograph either by direct injection or purge-and-trap (Method 5030). Method 5030 may be used directly on ground water samples or low-level contaminated soils and sediments. For medium-level soils or sediments, methanolic extraction, as described in Method 5030, may be necessary prior to purge-and-trap analysis.

### 7.2 Gas chromatography conditions (Recommended):

7.2.1 **Column 1:** Set helium gas flow at 36 mL/min flow rate. The temperature program sequences are as follows: For lower boiling compounds, operate at 50°C isothermal for 2 min; then program at 6°C/min to 90°C and hold until all compounds have eluted. For higher boiling range of compounds, operate at 50°C isothermal for 2 min; then program at 3°C/min to 110°C and hold until all compounds have eluted. Column 1 provides outstanding separations for a wide variety of aromatic hydrocarbons. Column 1 should be used as the primary analytical column because of its unique ability to resolve para-, meta-, and ortho-aromatic isomers.

7.2.2 **Column 2:** Set helium gas flow at 30 mL/min flow rate. The temperature program sequence is as follows: 40°C isothermal for 2 min; then 2°C/min to 100°C and hold until all compounds have eluted. Column 2, an extremely high-polarity column, has been used for a number of years to resolve aromatic hydrocarbons from alkanes in complex samples. However, because resolution between some of the aromatics is not as efficient as with Column 1, Column 2 should be used as a confirmatory column.

7.3 Calibration: Refer to Method 8000 for proper calibration techniques. Use Table 1 and especially Table 2 for guidance on selecting the lowest point on the calibration curve.

7.3.1 Calibration must take place using the same sample introduction method that will be used to analyze actual samples (see Section 7.4.1).

7.3.2 The procedure for internal or external calibration may be used. Refer to Method 8000 for a description of each of these procedures.

## 7.4 Gas chromatographic analysis:

7.4.1 Introduce volatile compounds into the gas chromatograph using either Method 5030 (purge-and-trap method) or the direct injection method. If the internal standard calibration technique is used, add 10 uL of internal standard to the sample prior to purging.

7.4.1.1 Direct injection: In very limited applications (e.g., aqueous process wastes), direct injection of the sample into the GC system with a 10 uL syringe may be appropriate. The detection limit is very high (approximately 10,000 ug/L); therefore, it is only permitted when concentrations in excess of 10,000 ug/L are expected or for water-soluble compounds that do not purge. The system must be calibrated by direct injection (bypassing the purge-and-trap device).

7.4.2 Follow Section 7.6 of Method 8000 for instructions on the analysis sequence, appropriate dilutions, establishing daily retention time windows, and identification criteria. Include a mid-level standard after each group of 10 samples in the analysis sequence.

7.4.3 Table 1 summarizes the estimated retention times and detection limits for a number of organic compounds analyzable using this method. An example of the separation achieved by Column 1 is shown in Figure 1. Figure 2 shows an example of the separation achieved using Column 2.

7.4.4 Record the sample volume purged or injected and the resulting peak sizes (in area units or peak heights).

7.4.5 Calculation of concentration is covered in Section 7.8 of Method 8000.

7.4.6 If analytical interferences are suspected, or for the purpose of confirmation, analysis using the second GC column is recommended.

7.4.7 If the response for a peak is off-scale, prepare a dilution of the sample with reagent water. The dilution must be performed on a second aliquot of the sample which has been properly sealed and stored prior to use.

## 8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures and Method 8000 for gas chromatographic procedures. Quality control to ensure the proper operation of the purge-and-trap device is covered in Method 5030.

8.2 Mandatory quality control to validate the GC system operation is found in Method 8000, Section 8.6.

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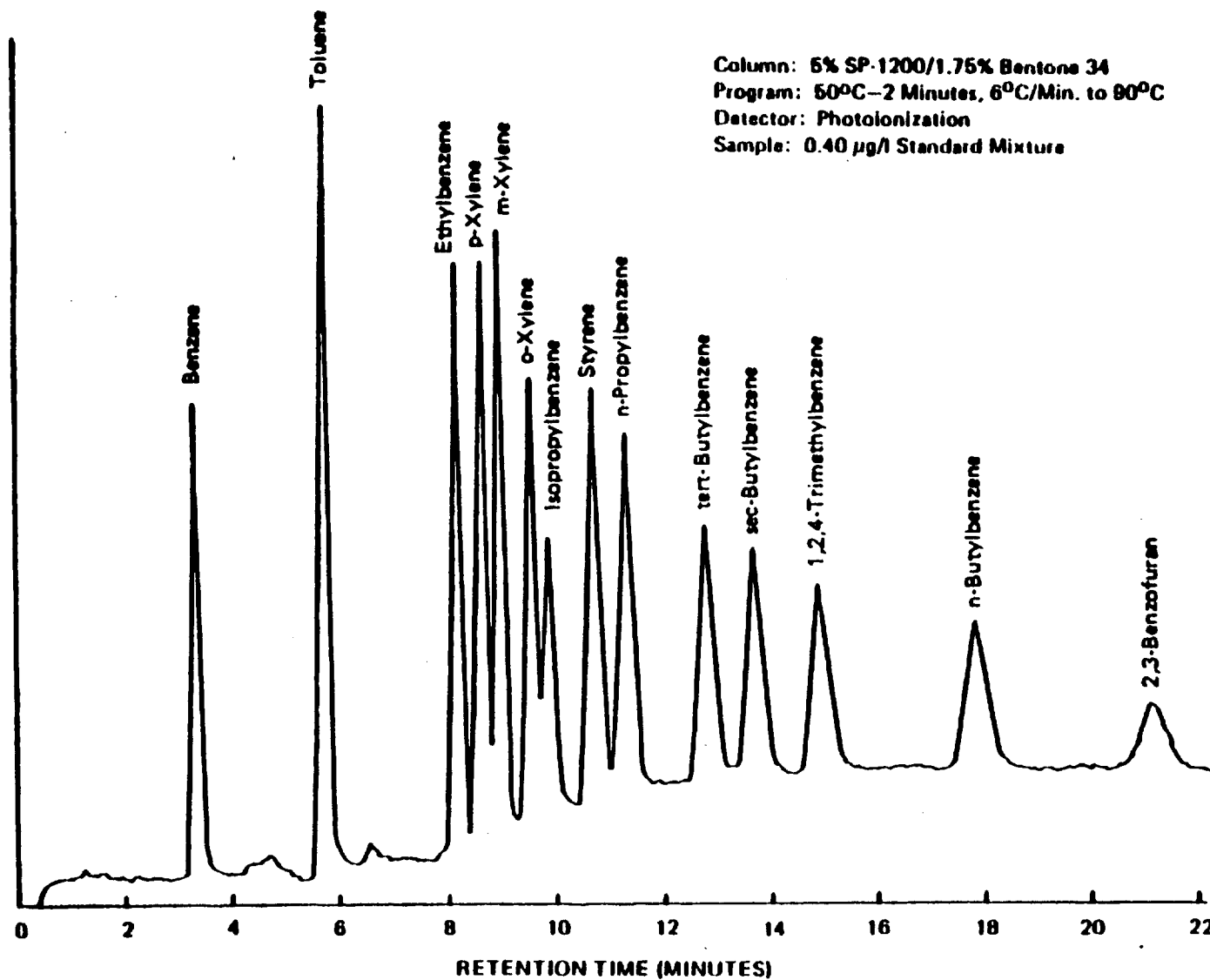
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Date September 1986

Figure 1. Chromatogram of aromatic volatile organics (column 1 conditions).

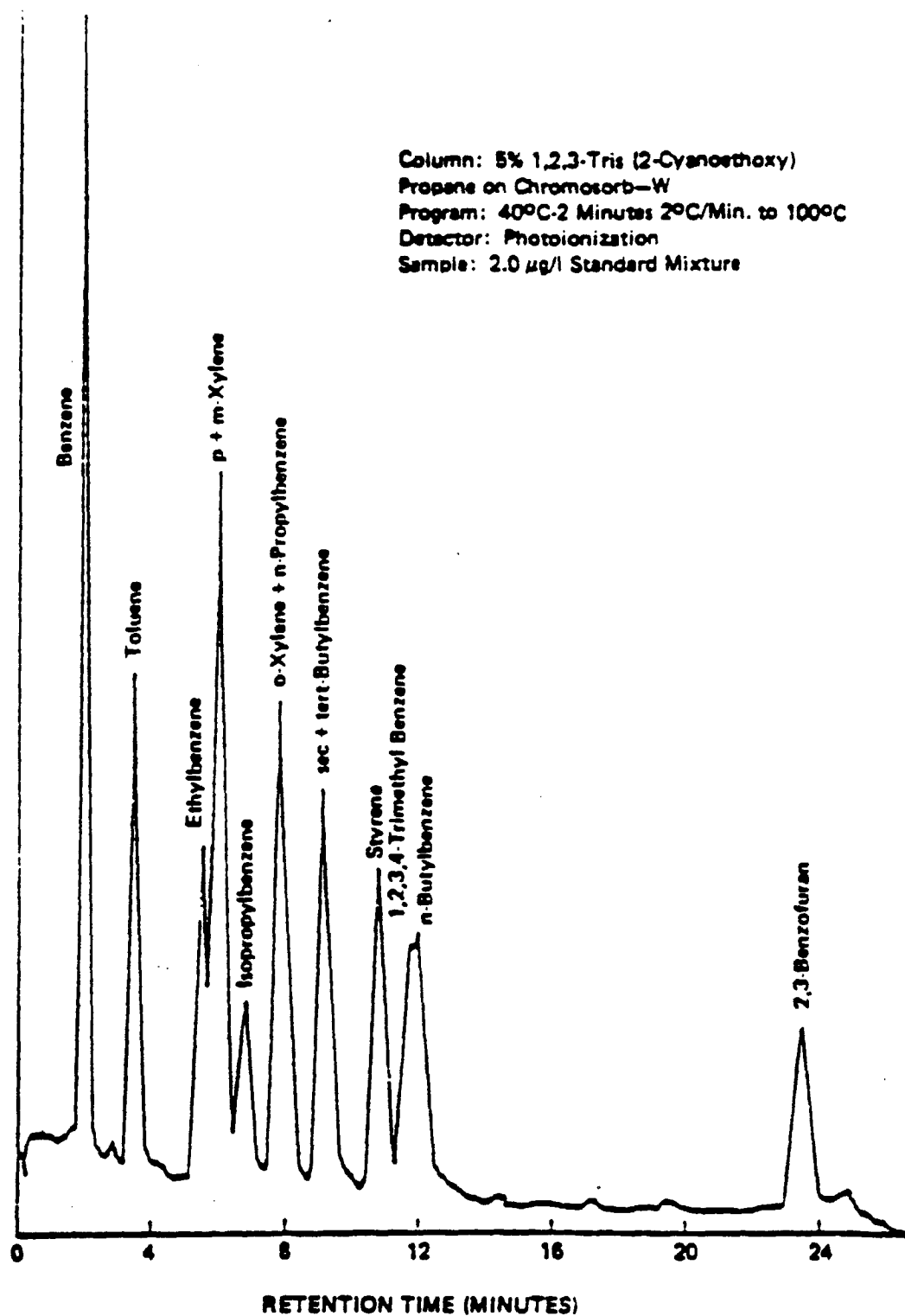


Figure 2. Chromatogram of aromatic volatile organics (column 2 conditions).



8.2.1 The quality control check sample concentrate (Method 8000, Section 8.6) should contain each parameter of interest at a concentration of 10 ug/mL in methanol.

8.2.2 Table 3 indicates the calibration and QC acceptance criteria for this method. Table 4 gives method accuracy and precision as functions of concentration for the analytes of interest. The contents of both Tables should be used to evaluate a laboratory's ability to perform and generate acceptable data by this method.

8.3 Calculate surrogate standard recovery on all samples, blanks, and spikes. Determine if recovery is within limits (limits established by performing QC procedure outlined in Method 8000, Section 8.10).

8.3.1 If recovery is not within limits, the following is required.

- Check to be sure there are no errors in calculations, surrogate solutions and internal standards. Also, check instrument performance.
- Recalculate the data and/or reanalyze the extract if any of the above checks reveal a problem.
- Reextract and reanalyze the sample if none of the above are a problem or flag the data as "estimated concentration."

## 9.0 METHOD PERFORMANCE

9.1 This method was tested by 20 laboratories using reagent water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 2.1-500 ug/L. Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the parameter and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 4.

9.2 The accuracy and precision obtained will be determined by the sample matrix, sample introduction technique, and by the calibration procedure used.

## 10.0 REFERENCES

1. Bellar, T.A., and J.J. Lichtenberg, J. Amer. Water Works Assoc., 66(12), pp. 739-744, 1974.
2. Bellar, T.A., and J.J. Lichtenberg, Semi-Automated Headspace Analysis of Drinking Waters and Industrial Waters for Purgeable Volatile Organic Compounds, in Van Hall (ed.), Measurement of Organic Pollutants in Water and Wastewater, ASTM STP 686, pp. 108-129, 1979.

3. Dowty, B.J., S.R. Antoine, and J.L. Laseter, "Quantitative and Qualitative Analysis of Purgeable Organics by High Resolution Gas Chromatography and Flame Ionization Detection," in Van Hall, ed., Measurement of Organic Pollutants in Water and Wastewater. ASTM STP 686, pp. 24-35, 1979.
4. Development and Application of Test Procedures for Specific Organic Toxic Substances in Wastewaters. Category 11 - Purgeables and Category 12 - Acrolein, Acrylonitrile, and Dichlorodifluoromethane. Report for EPA Contract 68-03-2635 (in preparation).
5. "EPA Method Validation Study 24, Method 602 (Purgeable Aromatics)," Report for EPA Contract 68-03-2856 (in preparation).
6. U.S. EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule," October 26, 1984.
7. Provost, L.P., and R.S. Elder, "Interpretation of Percent Recovery Data," American Laboratory, 15, pp. 58-63, 1983.

TABLE 3. CALIBRATION AND QC ACCEPTANCE CRITERIA<sup>a</sup>

Parameter	Range for Q (ug/L)	Limit for s (ug/L)	Range for $\bar{x}$ (ug/L)	Range P, P <sub>s</sub> (%)
Benzene	15.4-24.6	4.1	10.0-27.9	39-150
Chlorobenzene	16.1-23.9	3.5	12.7-25.4	55-135
1,2-Dichlorobenzene	13.6-26.4	5.8	10.6-27.6	37-154
1,3-Dichlorobenzene	14.5-25.5	5.0	12.8-25.5	50-141
1,4-Dichlorobenzene	13.9-26.1	5.5	11.6-25.5	42-143
Ethylbenzene	12.6-27.4	6.7	10.0-28.2	32-160
Toluene	15.5-24.5	4.0	11.2-27.7	46-148

Q = Concentration measured in QC check sample, in ug/L.

s = Standard deviation of four recovery measurements, in ug/L.

$\bar{x}$  = Average recovery for four recovery measurements, in ug/L.

P, P<sub>s</sub> = Percent recovery measured.

<sup>a</sup>Criteria are from 40 CFR Part 136 for Method 602 and were calculated assuming a QC check sample concentration of 20 ug/L. These criteria are based directly upon the method performance data in Table 4. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 1.

TABLE 4. METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION

Parameter	Accuracy, as recovery, $x'$ (ug/L)	Single analyst precision, $s_r'$ (ug/L)	Overall precision, $S'$ (ug/L)
Benzene	$0.92C+0.57$	$0.09\bar{X}+0.59$	$0.21\bar{X}+0.56$
Chlorobenzene	$0.95C+0.02$	$0.09\bar{X}+0.23$	$0.17\bar{X}+0.10$
1,2-Dichlorobenzene	$0.93C+0.52$	$0.17\bar{X}-0.04$	$0.22\bar{X}+0.53$
1,3-Dichlorobenzene	$0.96C-0.04$	$0.15\bar{X}-0.10$	$0.19\bar{X}+0.09$
1,4-Dichlorobenzene	$0.93C-0.09$	$0.15\bar{X}+0.28$	$0.20\bar{X}+0.41$
Ethylbenzene	$0.94C+0.31$	$0.17\bar{X}+0.46$	$0.26\bar{X}+0.23$
Toluene	$0.94C+0.65$	$0.09\bar{X}+0.48$	$0.18\bar{X}-0.71$

$x'$  = Expected recovery for one or more measurements of a sample containing a concentration of  $C$ , in ug/L.

$s_r'$  = Expected single analyst standard deviation of measurements at an average concentration of  $\bar{X}$ , in ug/L.

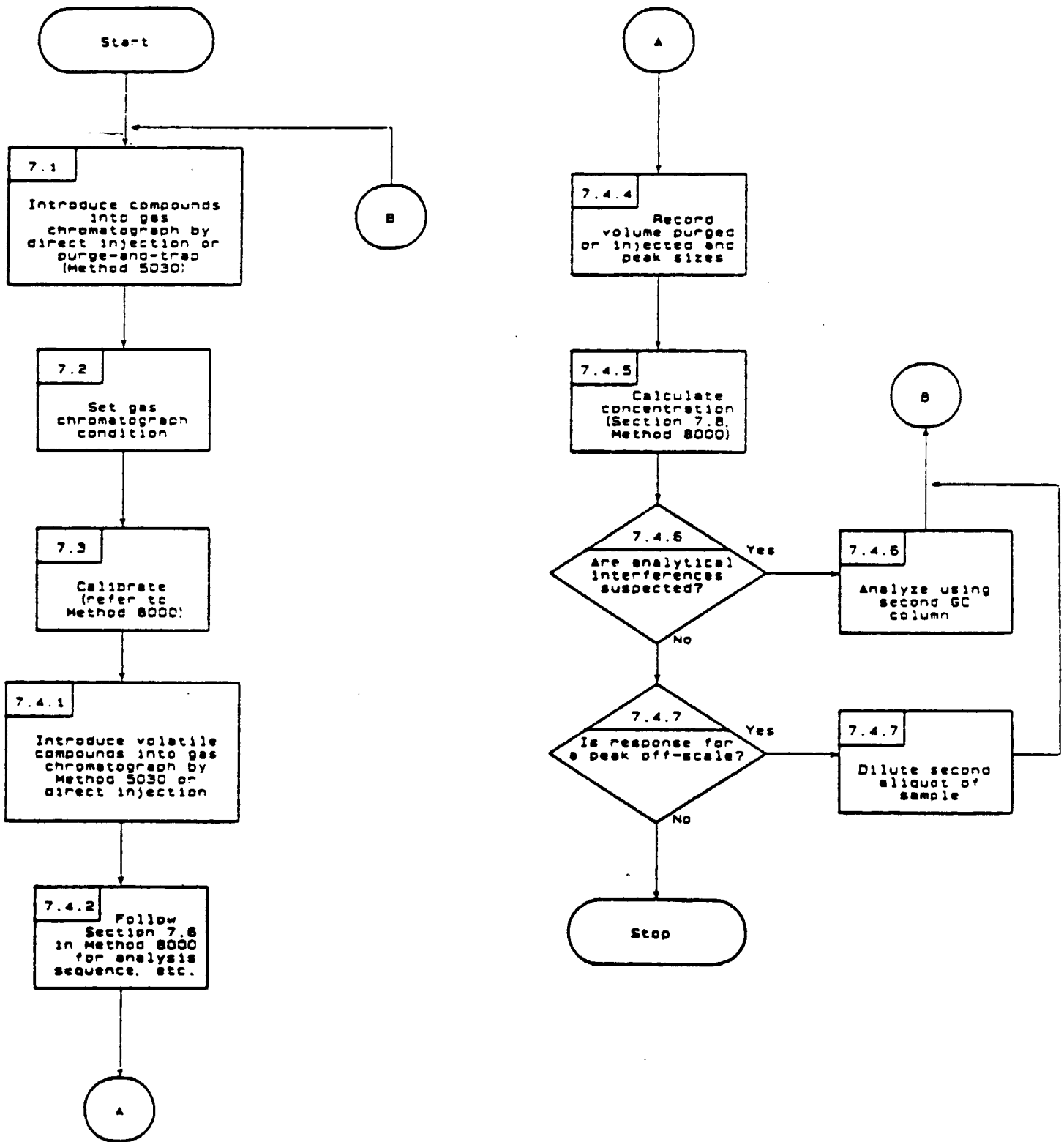
$S'$  = Expected interlaboratory standard deviation of measurements at an average concentration found of  $\bar{X}$ , in ug/L.

$C$  = True value for the concentration, in ug/L.

$\bar{X}$  = Average recovery found for measurements of samples containing a concentration of  $C$ , in ug/L.

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METHOD 8020  
AROMATIC VOLATILE ORGANICS



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## METHOD 8040

### PHENOLS

#### 1.0 SCOPE AND APPLICATION

1.1 Method 8040 is used to determine the concentration of various phenolic compounds. Table 1 indicates compounds that may be analyzed by this method and lists the method detection limit for each compound in water. Table 2 lists the practical quantitation limit (PQL) for all matrices.

#### 2.0 SUMMARY OF METHOD

2.1 Method 8040 provides gas chromatographic conditions for the detection of phenolic compounds. Prior to analysis, samples must be extracted using appropriate techniques (see Chapter Two for guidance). Both neat and diluted organic liquids (Method 3580, Waste Dilution) may be analyzed by direct injection. A 2- to 5-uL sample is injected into a gas chromatograph using the solvent flush technique, and compounds in the GC effluent are detected by a flame ionization detector (FID).

2.2 Method 8040 also provides for the preparation of pentafluorobenzyl-bromide (PFB) derivatives, with additional cleanup procedures for electron capture gas chromatography. This is to reduce detection limits of some phenols and to aid the analyst in the elimination of interferences.

#### 3.0 INTERFERENCES

3.1 Refer to Methods 3500, 3600, and 8000.

3.2 Solvents, reagents, glassware, and other sample processing hardware may yield discrete artifacts and/or elevated baselines causing misinterpretation of gas chromatograms. All these materials must be demonstrated to be free from interferences, under the conditions of the analysis, by analyzing calibration and reagent blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be required.

3.3 Interferences coextracted from samples will vary considerably from source to source, depending upon the waste being sampled. Although general cleanup techniques are recommended as part of this method, unique samples may require additional cleanup.

#### 4.0 APPARATUS AND MATERIALS

##### 4.1 Gas chromatograph

4.1.1 Gas Chromatograph - Analytical system complete with gas chromatograph suitable for on-column injections and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak areas and/or peak heights is recommended.



#### 4.1.2 Columns

4.1.2.1 Column for underivatized phenols - 1.8 m x 2.0 mm i.d. glass column packed with 1% SP-1240DA on Supelcoport 80/100 mesh or equivalent.

4.1.2.2 Column for derivatized phenols - 1.8 m x 2 mm i.d. glass column packed with 5% OV-17 on Chromosorb W-AW-DMCS 80/100 mesh or equivalent.

4.1.3 Detectors - Flame ionization (FID) and electron capture (ECD).

4.2 Reaction vial - 20-mL, with Teflon lined cap.

4.3 Volumetric flask - 10-, 50-, and 100-mL, ground-glass stopper.

4.4 Kuderna-Danish (K-D) apparatus

4.4.1 Concentrator tube - 10-mL, graduated (Kontes K-570050-1025 or equivalent). Ground-glass stopper is used to prevent evaporation of extracts.

4.4.2 Evaporation flask - 500-mL (Kontes K-570001-500 or equivalent). Attach to concentrator tube with springs.

4.4.3 Snyder column - Three ball macro (Kontes K-503000-0121 or equivalent).

4.4.4 Snyder column - Two ball micro (Kontes K-569001-0219 or equivalent).

4.5 Boiling chips - Solvent extracted, approximately 10/40 mesh (silicon carbide or equivalent).

4.6 Water bath - Heated, with concentric ring cover, capable of temperature control ( $\pm 5^{\circ}\text{C}$ ). The bath should be used in a hood.

4.7 Microsyringe - 10-uL.

4.8 Syringe - 5-mL.

#### 5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 ASTM Type II Water (ASTM D1193-77 (1983)). All references to water in the method refer to ASTM Type II unless otherwise specified.

5.3 Hexane,  $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$ . Pesticide quality or equivalent.

5.4 2-Propanol,  $(\text{CH}_3)_2\text{CHOH}$ . Pesticide quality or equivalent.

5.5 Toluene,  $\text{C}_6\text{H}_5\text{CH}_3$ . Pesticide quality or equivalent.

5.6 Derivatization reagent - Add 1 mL pentafluorobenzyl bromide and 1 g 18-crown-6-ether to a 50-mL volumetric flask and dilute to volume with 2-propanol. Prepare fresh weekly. This operation should be carried out in a hood. Store at 4°C and protect from light.

5.6.1 Pentafluorobenzyl bromide (alpha-Bromopentafluorotoluene),  $\text{C}_6\text{F}_5\text{CH}_2\text{Br}$ . 97% minimum purity.

NOTE: This chemical is a lachrymator.

5.6.2 18-crown-6-ether (1,4,7,10,13,16-Hexaoxacyclooctadecane) - 98% minimum purity.

NOTE: This chemical is highly toxic.

5.7 Potassium carbonate (Powdered),  $\text{K}_2\text{CO}_3$ .

5.8 Stock standard solutions

5.8.1 Prepare stock standard solution at a concentration of 1.00 ug/uL by dissolving 0.0100 g of assayed reference material in 2-propanol and diluting to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight can be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards can be used at any concentration if they are certified by the manufacturer or by an independent source.

5.8.2 Transfer the stock standard solutions into bottles with Teflon lined screw-caps. Store at 4°C and protect from light. Stock standards should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.8.3 Stock standard solutions must be replaced after one year, or sooner if comparison with check standards indicates a problem.

5.9 Calibration standards - Calibration standards at a minimum of five concentration levels should be prepared through dilution of the stock standards with 2-propanol. One of the concentration levels should be at a concentration near, but above, the method detection limit. The remaining concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC.

Calibration solutions must be replaced after six months, or sooner, if comparison with check standards indicates a problem.

5.10 Internal standards (if internal standard calibration is used) - To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples.

5.10.1 Prepare calibration standards at a minimum of five concentrations for each analyte as described in Step 5.9.

5.10.2 To each calibration standard, add a known constant amount of one or more internal standards, and dilute to volume with 2-propanol.

5.10.3 Analyze each calibration standard according to Section 7.0.

5.11 Surrogate standards - The analyst should monitor the performance of the extraction, cleanup (if necessary), and analytical system and the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard, and water blank with phenolic surrogates (e.g. 2-fluorophenol and 2,4,6-tribromophenol) recommended to encompass the range of the temperature program used in this method. Method 3500, Step 5.3.1.1, details instructions on the preparation of acid surrogates. Deuterated analogs of analytes should not be used as surrogates for gas chromatographic analysis due to coelution problems.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Step 4.1. Extracts must be stored under refrigeration and analyzed within 40 days of extraction.

## 7.0 PROCEDURE

### 7.1 Extraction

7.1.1 Refer to Chapter Two for guidance on choosing the appropriate extraction procedure. In general, water samples are extracted at a pH of less than or equal to 2 with methylene chloride, using either Method 3510 or 3520. Solid samples are extracted using either Method 3540 or 3550. Extracts obtained from application of either Method 3540 or 3550 should undergo Acid-Base Partition Cleanup, using Method 3650.

7.1.2 Prior to gas chromatographic analysis, the extraction solvent must be exchanged to 2-propanol. The exchange is performed during the micro K-D procedures listed in all of the extraction methods. The exchange is performed as follows:

7.1.2.1 Following concentration of the extract to 1 mL using the macro- Snyder column, allow the apparatus to cool and drain for at least 10 minutes.

7.1.2.2 Increase the temperature of the hot water bath to 95-100°C. Remove the Snyder column and rinse the flask and its lower joint into the concentrator tube with 1-2 mL of 2-propanol. A 5-mL syringe is recommended for this operation. Add one or two clean boiling chips to the concentrator tube and attach a two ball micro-Snyder column. Prewet the column by adding about 0.5 mL of 2-propanol to the top. Place the K-D apparatus on the water bath so that the concentrator tube is partially immersed in the hot water. Adjust the vertical position of the apparatus and the water temperature, as required, to complete concentration in 5-10 minutes. At the proper rate of distillation the balls of the column will actively chatter, but the chambers will not flood. When the apparent volume of liquid reaches 2.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 minutes. Add an additional 2 mL of 2-propanol, add one or two clean boiling chips to the concentrator tube, and resume concentrating as before. When the apparent volume of liquid reaches 0.5 mL, remove the K-D apparatus and allow it to drain and cool for at least 10 minutes.

7.1.2.3 Remove the micro-Snyder column and rinse its lower joint into the concentrator tube with a minimum amount of 2-propanol. Adjust the extract volume to 1.0 mL. Stopper the concentrator tube and store refrigerated at 4°C if further processing will not be performed immediately. If the extract will be stored longer than two days, it should be transferred to a vial with a Teflon lined screw-cap. If the extract requires no further derivatization or cleanup, proceed with gas chromatographic analysis.

## 7.2 Gas chromatography conditions (Recommended)

7.2.1 Column for underivatized phenols - Set nitrogen gas flow at 30 mL/min flow rate. Set column temperature at 80°C and immediately program an 8°C/min temperature rise to 150°C; hold until all compounds have eluted.

7.2.2 Column for derivatized phenols - Set 5% methane/95% argon gas flow at 30 mL/min flow rate. Set column temperature at 200°C isothermal.

7.3 Calibration - Refer to Method 8000 for proper calibration techniques. Use Table 1 and especially Table 2 for guidance on selecting the lowest point on the calibration curve.

7.3.1 The procedure for internal or external calibration may be used for the underivatized phenols. Refer to Method 8000 for a description of each of these procedures. If derivatization of the phenols is required, the method of external calibration should be used by injecting five or more levels of calibration standards that have also undergone derivatization and cleanup prior to instrument calibration.

## 7.4 Gas chromatographic analysis

7.4.1 Refer to Method 8000. If the internal standard calibration technique is used, add 10 uL of internal standard to the sample prior to injection.

7.4.2 Phenols are to be determined on a gas chromatograph equipped with a flame ionization detector according to the conditions listed for the 1% SP-1240DA column (Step 7.2.1). Table 1 summarizes estimated retention times and sensitivities that should be achieved by this method for clean water samples. Practical quantitation limits for other matrices are list in Table 2.

7.4.3 Follow Step 7.6 in Method 8000 for instructions on the analysis sequence, appropriate dilutions, establishing daily retention time windows, and identification criteria. Include a mid-level standard after each group of 10 samples in the analysis sequence.

7.4.4 An example of a GC/FID chromatogram for certain phenols is shown in Figure 1. Other packed or capillary (open-tubular) columns, chromatographic conditions, or detectors may be used if the requirements of Step 8.2 are met.

7.4.5 Record the sample volume injected and the resulting peak sizes (in area units or peak heights).

7.4.6 Using either the internal or external calibration procedure (Method 8000), determine the identity and quantity of each component peak in the sample chromatogram which corresponds to the compounds used for calibration purposes. See Step 7.8 of Method 8000 for calculation equations.

7.4.7 If peak detection using the SP-1240DA column with the flame ionization detector is prevented by interferences, PFB derivatives of the phenols should be analyzed on a gas chromatograph equipped with an electron capture detector according to the conditions listed for the 5% OV-17 column (Step 7.2.2). The derivatization and cleanup procedure is outlined in Steps 7.5 through 7.6. Table 3 summarizes estimated retention times for derivatives of some phenols using the conditions of this method.

7.4.8 Figure 2 shows a GC/ECD chromatogram of PFB derivatives of certain phenols.

7.4.9 Record the sample volume injected and the resulting peak sizes (in area units or peak heights).

7.4.10 Determine the identity and quantity of each component peak in the sample chromatogram which corresponds to the compounds used for calibration purposes. The method of external calibration should be used (see Method 8000 for guidance). The concentration of the individual compounds in the sample is calculated as follows:

$$\text{Concentration (ug/L)} = [(A)(V_t)(B)(D)] / [(V_i)(X)(C)(E)]$$

where:

A = Mass of underivatized phenol represented by area of peak in sample chromatogram, determined from calibration curve (see Method 8000 Step 7.4.2), ng.

$V_t$  = Total amount of column eluate or combined fractions from which  $V_i$  was taken,  $\mu\text{L}$ .

B = Total volume of hexane added in Step 7.5.5, mL.

D = Total volume of 2-propanol extract prior to derivatization, mL.

$V_i$  = Volume injected,  $\mu\text{L}$ .

X = Volume of water extracted, mL, or weight of nonaqueous sample extracted, g, from Step 7.1. Either the dry or wet weight of the nonaqueous sample may be used, depending upon the specific application of the data.

C = Volume of hexane sample solution added to cleanup column (Method 3630, Step 7.2), mL.

E = Volume of 2-propanol extract carried through derivatization in Step 7.5.1, mL.

7.5 Derivatization - If interferences prevent measurement of peak area during analysis of the extract by flame ionization gas chromatography, the phenols must be derivatized and analyzed by electron capture gas chromatography.

7.5.1 Pipet a 1.0-mL aliquot of the 2-propanol stock standard solution or of the sample extract into a glass reaction vial. Add 1.0 mL derivatization reagent (Step 5.3). This amount of reagent is sufficient to derivatize a solution whose total phenolic content does not exceed 0.3 mg/mL.

7.5.2 Add approximately 3 mg of potassium carbonate to the solution and shake gently.

7.5.3 Cap the mixture and heat it for 4 hours at 80°C in a hot water bath.

7.5.4 Remove the solution from the hot water bath and allow it to cool.

7.5.5 Add 10 mL hexane to the reaction vial and shake vigorously for 1 minute. Add 3.0 mL water to the reaction vial and shake for 2 minutes.

7.5.6 Decant the organic layer into a concentrator tube and cap with a glass stopper. Proceed with cleanup procedure.

## 7.6 Cleanup

7.6.1 Cleanup of the derivatized extracts takes place using Method 3630 (Silica Gel Cleanup), in which specific instructions for cleanup of the derivatized phenols appear.

7.6.2 Following column cleanup, analyze the samples using GC/ECD, as described starting in Step 7.4.7.

## 8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures. Quality control to validate sample extraction is covered in Method 3500 and in the extraction method used. If extract cleanup was performed, follow the QC in Method 3600 and in the specific cleanup method.

8.2 Procedures to check the GC system operation are found in Method 8000, Step 8.6.

8.2.1 The quality control check sample concentrate (Method 8000, Step 8.6) should contain each analyte of interest at a concentration of 100 ug/mL in 2-propanol.

8.2.2 Table 4 indicates the calibration and QC acceptance criteria for this method. Table 5 gives method accuracy and precision as functions of concentration for the analytes. The contents of both Tables should be used to evaluate a laboratory's ability to perform and generate acceptable data by this method.

8.3 Calculate surrogate standard recovery on all samples, blanks, and spikes. Determine if the recovery is within limits (limits established by performing QC procedures outlined in Method 8000, Step 8.10).

8.3.1 If recovery is not within limits, the following is required.

- Check to be sure there are no errors in calculations, surrogate solutions and internal standards. Also, check instrument performance.
- Recalculate the data and/or reanalyze the extract if any of the above checks reveal a problem.
- Reextract and reanalyze the sample if none of the above are a problem or flag the data as "estimated concentration."

## 9.0 METHOD PERFORMANCE

9.1 The method was tested by 20 laboratories using water, drinking water, surface water, and three industrial wastewaters spiked at six concentrations over the range 12 to 450 ug/L. Single operator precision, overall precision, and method accuracy were found to be directly related to the concentration of the analyte and essentially independent of the sample

matrix. Linear equations to describe these relationships for a flame ionization detector are presented in Table 5.

9.2 The accuracy and precision obtained will be affected by the sample matrix, sample-preparation technique, and calibration procedures used.

## 10.0 REFERENCES

1. Development and Application of Test Procedures for Specific Organic Toxic Substances in Wastewaters. Category 3 - Chlorinated Hydrocarbons and Category 8 - Phenols. Report for EPA Contract 68-03-2625 (in preparation).
2. U.S. EPA 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Final Rule and Interim Final Rule and Proposed Rule," October 26, 1984.
3. "Determination of Phenols in Industrial and Municipal Wastewaters," Report for EPA Contract 68-03-2625 (in preparation).
4. "EPA Method Validation Study Test Method 604 (Phenols)," Report for EPA Contract 68-03-2625 (in preparation).
5. Kawarahara, F.K. "Microdetermination of Derivatives of Phenols and Mercaptans by Means of Electron Capture Gas Chromatography," Analytical Chemistry, 40, 1009, 1968.
6. Provost, L.P. and R.S. Elder, "Interpretation of Percent Recovery Data," American Laboratory, 15, pp. 58-63, 1983.
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8. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Society Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.
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TABLE 1.  
FLAME IONIZATION GAS CHROMATOGRAPHY OF PHENOLS

Compound	Retention time (minutes)	Method Detection limit (ug/L)
2-sec-Butyl-4,6-dinitrophenol (DNBP)		
- 4-Chloro-3-methylphenol	7.50	0.36
- 2-Chlorophenol	1.70	0.31
- Cresols (methyl phenols)		
2-Cyclohexyl-4,6-dinitrophenol		
- 2,4-Dichlorophenol	4.30	0.39
2,6-Dichlorophenol		
2,4-Dimethylphenol	4.03	0.32
- 2,4-Dinitrophenol	10.00	13.0
- 2-Methyl-4,6-dinitrophenol	10.24	16.0
- 2-Nitrophenol	2.00	0.45
- 4-Nitrophenol	24.25	2.8
Pentachlorophenol	12.42	7.4
- Phenol	3.01	0.14
Tetrachlorophenols		
- Trichlorophenols		
- 2,4,6-Trichlorophenol	6.05	0.64

- on TAL (Vol)

TABLE 2.  
DETERMINATION OF PRACTICAL QUANTITATION  
LIMITS (PQL) FOR VARIOUS MATRICES<sup>a</sup>

Matrix	Factor <sup>b</sup>
Ground water	10
Low-level soil by sonication with GPC cleanup	670
High-level soil and sludges by sonication	10,000
Non-water miscible waste	100,000

<sup>a</sup>Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

<sup>b</sup>PQL = [Method detection limit (Table 1)] X [Factor (Table 2)]. For non-aqueous samples, the factor is on a wet-weight basis.

**TABLE 3.**  
**ELECTRON CAPTURE GAS CHROMATOGRAPHY OF PFB DERIVATIVES**

Parent compound	Retention time (min)	Method detection limit (ug/L)
4-Chloro-2-methylphenol	4.8	1.8
2-Chlorophenol	3.3	0.58
2,4-Dichlorophenol	5.8	0.68
2,4-Dimethylphenol	2.9	0.63
2,4-Dinitrophenol	46.9	
2-Methyl-4,6-dinitrophenol	36.6	
2-Nitrophenol	9.1	0.77
4-Nitrophenol	14.0	0.70
Pentachlorophenol	28.8	0.59
Phenol	1.8	2.2
2,4,6-Trichlorophenol	7.0	0.58

TABLE 4.  
QC ACCEPTANCE CRITERIA<sup>a</sup>

Parameter	Test conc. (ug/L)	Limit for s (ug/L)	Range for x (ug/L)	Range P, P <sub>s</sub> (%)
4-Chloro-3-methylphenol	100	16.6	56.7-113.4	99-122
2-Chlorophenol	100	27.0	54.1-110.2	38-126
2,4-Dichlorophenol	100	25.1	59.7-103.3	44-119
2,4-Dimethylphenol	100	33.3	50.4-100.0	24-118
4,6-Dinitro-2-methylphenol	100	25.0	42.4-123.6	30-136
2,4-Dinitrophenol	100	36.0	31.7-125.1	12-145
2-Nitrophenol	100	22.5	56.6-103.8	43-117
4-Nitrophenol	100	19.0	22.7-100.0	13-110
Pentachlorophenol	100	32.4	56.7-113.5	36-134
Phenol	100	14.1	32.4-100.0	23-108
2,4,6-Trichlorophenol	100	16.6	60.8-110.4	53-119

s = Standard deviation of four recovery measurements, in ug/L.

x = Average recovery for four recovery measurements, in ug/L.

P, P<sub>s</sub> = Percent recovery measured.

<sup>a</sup>Criteria from 40 CFR Part 136 for Method 604. These criteria are based directly upon the method performance data in Table 5. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 5.

TABLE 5.  
METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION<sup>a</sup>

Parameter	Accuracy, as recovery, $x'$ (ug/L)	Single analyst precision, $s_r'$ (ug/L)	Overall precision, $S'$ (ug/L)
4-Chloro-3-methylphenol	0.87C-1.97	0.11x-0.21	0.16x+1.41
2-Chlorophenol	0.83C-0.84	0.18x+0.20	0.21x+0.75
2,4-Dichlorophenol	0.81C+0.48	0.17x-0.02	0.18x+0.62
2,4-Dimethylphenol	0.62C-1.64	0.30x-0.89	0.25x+0.48
4,6-Dinitro-2-methylphenol	0.84C-1.01	0.15x+1.25	0.19x+5.85
2,4-Dinitrophenol	0.80C-1.58	0.27x-1.15	0.29x+4.51
2-Nitrophenol	0.81C-0.76	0.15x+0.44	0.14x+3.84
4-Nitrophenol	0.46C+0.18	0.17x+2.43	0.19x+4.79
Pentachlorophenol	0.83C+2.07	0.22x-0.58	0.23x+0.57
Phenol	0.43C+0.11	0.20x-0.88	0.17x+0.77
2,4,6-Trichlorophenol	0.86C-0.40	0.10x+0.53	0.13x+2.40

$x'$  = Expected recovery for one or more measurements of a sample containing a concentration of C, in ug/L.

$s_r'$  = Expected single analyst standard deviation of measurements at an average concentration of  $\bar{x}$ , in ug/L.

$S'$  = Expected interlaboratory standard deviation of measurements at an average concentration found of  $\bar{x}$ , in ug/L.

C = True value for the concentration, in ug/L.

$\bar{x}$  = Average recovery found for measurements of samples containing a concentration of C, in ug/L.

<sup>a</sup>From 40 CFR Part 136 for Method 604.

Figure 1.

Gas chromatogram of phenols.

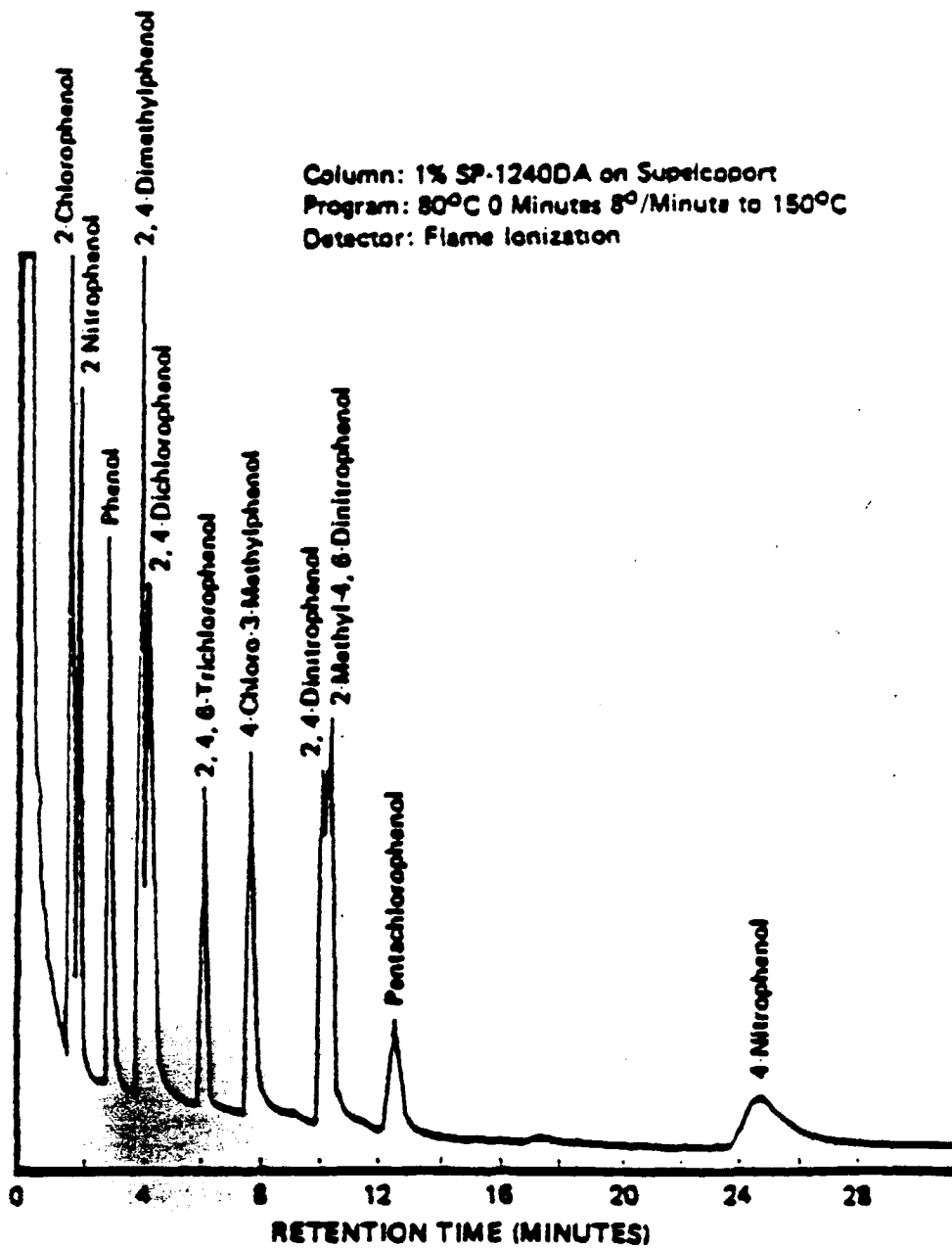
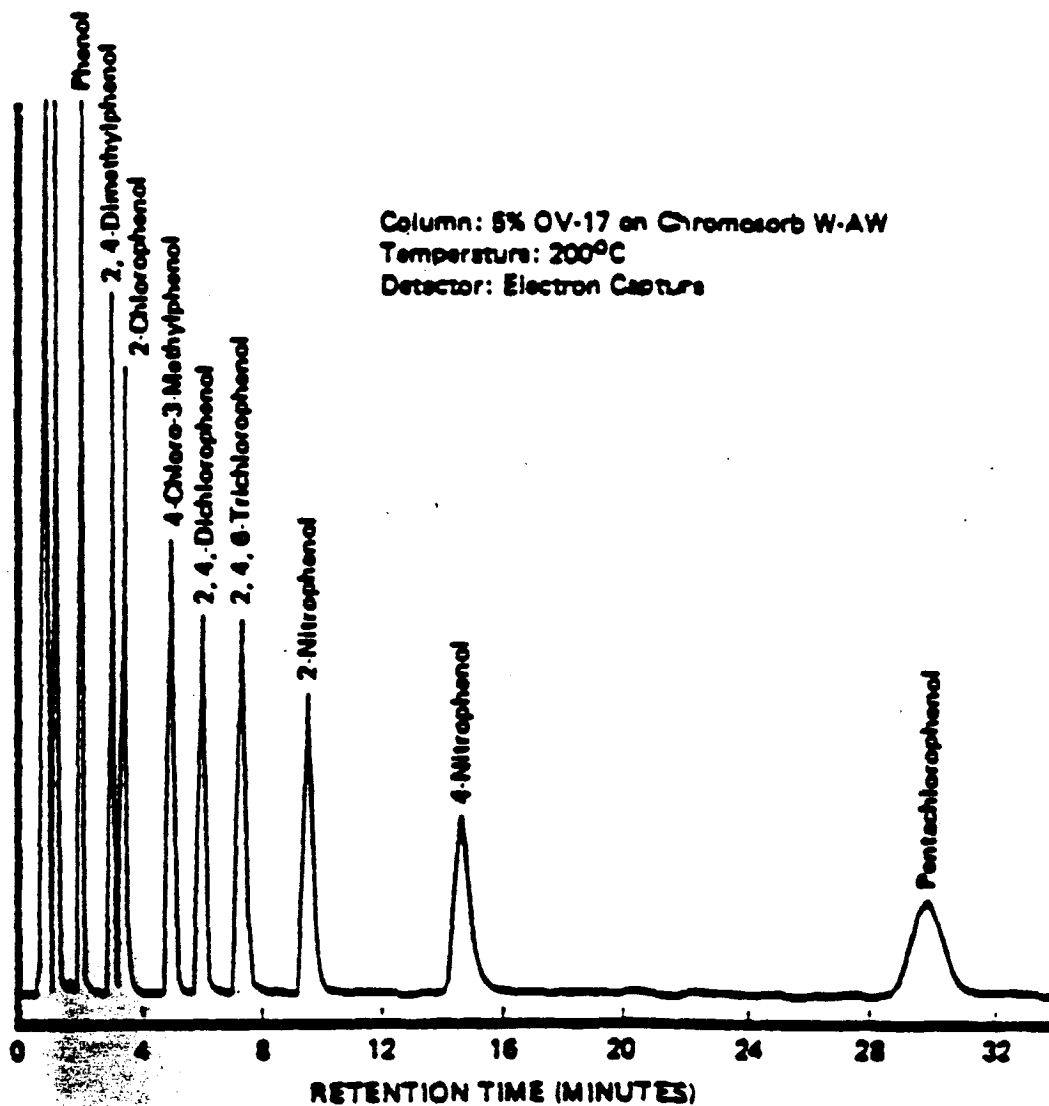


Figure 2.

Gas chromatogram of PFB derivatives of phenols.



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METHOD 8040  
PHENOLS

